PMM

Precision Metal Molding

INCLUDING DIE CASTINGS MAGAZINE

AUGUST
1955

devoted exclusively to:

DIE CASTINGS

INVESTMENT CASTINGS

PERMANENT MOLD CASTINGS

PLASTER MOLD CASTINGS

POWDER METALLURGY

SHELL MOLD CASTINGS

"For fire fighting equipment, die castings combine operational reliability and manufacturing economy."

See page 3

COURTESY B POWERS OWNER
UNIVERSITY MICROFILMS
313 N FIRST ST
ANN ARBOR MICH.
P1A891

Aluminum or Zinc Alloys

that always help you get better quality castings and trouble-free production

Aluminum

ALLOYS

- All ingot produced for die casting, permanent mold and sand casting requirements have superior working characteristics and are free from impurities and gas.
- Composition is constantly checked during production to assure ingot meets your specifications.
- Orders are promptly processed and shipped with certificate of analysis.
- Shipments are palletized for fast, efficient handling.

Zamak

ZINC BASE DIE CASTING ALLOYS

- All ingot is quality controlled during production to insure uniform quality metal.
- All alloys to your specifications.
- All shipments are palletized and shipped with a certificate of analysis.
- Deliveries are promptly made to meet your production schedule.

Aluminum Smelting & Refining Co., Inc.

BEDFORD, OHIO
TELEPHONE: CLEVELAND MOntrose 2-3100

INDIANAPOLIS, INDIANA
215 Circle tower • PHONE: MElrose 8-5541

DETROIT, MICHIGAN
P. O. BOX 4014 • PHONE: VErmont 7-9962

Certified Alloys Co.

BEDFORD, OHIO
TELEPHONE: CLEVELAND MOntrose 2-3100

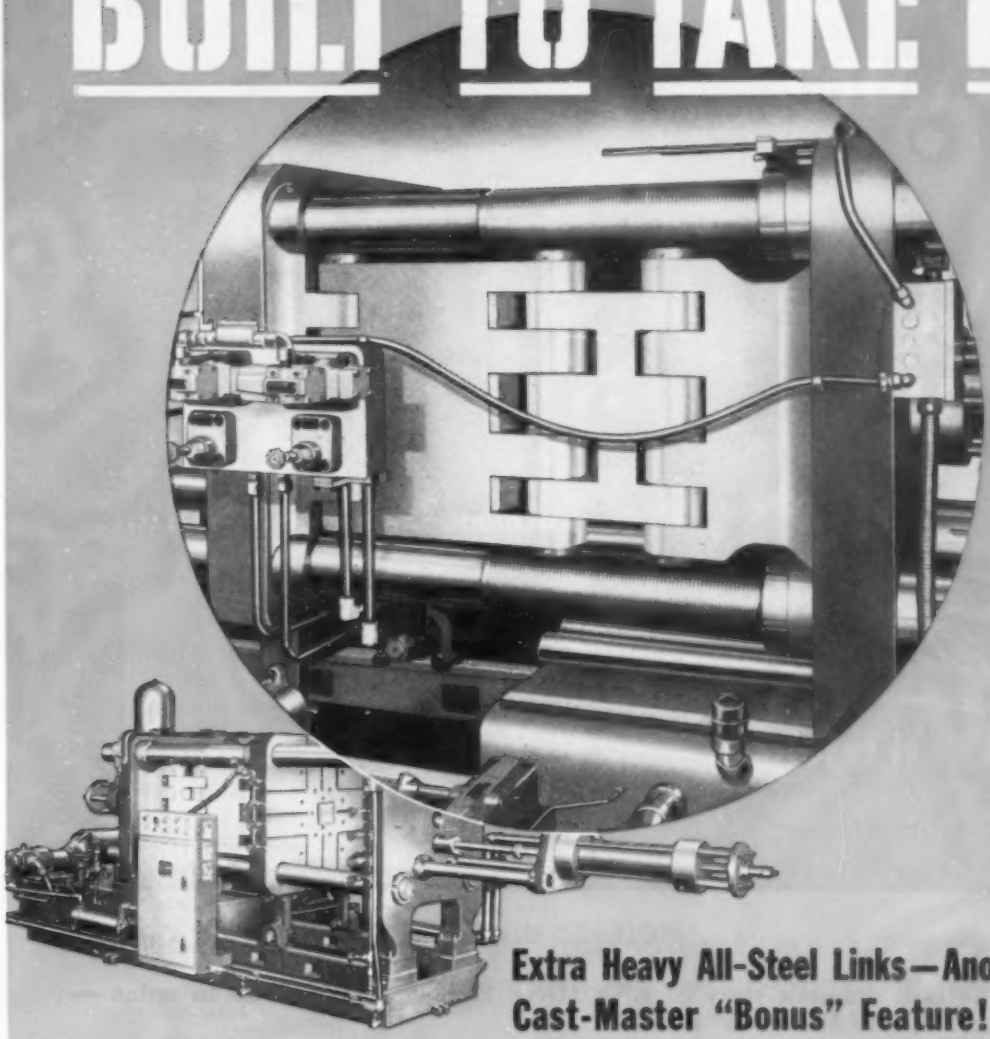
INDIANAPOLIS, INDIANA
215 CIRCLE TOWER • PHONE: MElrose 8-5541

DETROIT, MICHIGAN
P. O. BOX 4014 • PHONE: VErmont 7-9962

LOS ANGELES PLANT
9323 BERMUDEZ ST., RIVERA, CALIF.
PHONE: OXford 9-9610

For more information circle No. 4 on the Reader Service Card

BUILT TO TAKE IT



Extra Heavy All-Steel Links—Another Cast-Master "Bonus" Feature! . . .

The story of Cast-Master quality is a story of "bonus" features — like the link system shown here. Cast-Master links are super-rugged — all-steel — machined — with wide spread for positive lock-up, and multiple shear points to eliminate link pin breakage. Result? — more precision — lower maintenance costs for Cast-Master owners. To get the complete "bonus" story, send for the new Cast-Master catalog. It describes exclusive Cast-Master developments, gives detailed specifications on eight new models that are setting the pace for the industry.

EASTERN REPRESENTATIVE: Milton Harmes, 18 Rock Road, Milford, Connecticut

CAST-MASTER Inc. 2123 HAMILTON AVE. CLEVELAND 14, OHIO

For more information circle No. 13 on the Reader Service Card

STRIPPING ENAMEL . . .

SAVING TIME

*Enthonics** AT WORK

IMMERSED . . . THE WATCH STARTS!

15 SECONDS . . . WRINKLING TAKES PLACE!

25 SECONDS . . . STRIPPING COMPLETED!

25 seconds from immersion to completed stripping!

That's the fast, dramatic story of ENTHONE Enamel Stripper S-18 in action — another example of *Enthonics at work.**

Enthone Enamel Stripper S-18 is the modern organic stripper developed for removing the newest organic finishes such as Epon or Epoxy coatings and many synthetic enamels from copper, copper alloys, steel and aluminum.

For the right strippers to solve your organic stripping problems fill out a questionnaire we'll send at your request; return it with typical samples of your work. Enthonics will find the answer . . . without obligation!

And ask for your copy of the "Enthone Check List" of literature covering more than 60 products and processes developed for modern electroplating and metal finishing.

** The Scientific Solution of Metal Finishing Problems*

ENTHONE INCORPORATED

METAL FINISHING PROCESSES

442 ELM STREET, NEW HAVEN 11, CONNECTICUT

ELECTROPLATING CHEMICALS

Service Representatives and Stock Points: BINGHAMTON, N. Y., Austin F. Fletcher, Inc.; CHICAGO, Ardco, Inc.; CLEVELAND, R. O. Hull & Co.; DALLAS, Weaver Engineering & Supply Co., Inc.; LOS ANGELES, L. H. Butcher Co.

For more information circle No. 18 on the Reader Service Card

PMM

August 1955

Volume 13 Number 8

Precision Metal Molding

DIE CASTINGS
INVESTMENT CASTINGS
PLASTER MOLD CASTINGS
PERMANENT MOLD CASTINGS
POWDER METALLURGY
SHELL MOLD CASTINGS

IRVING B. HEXTER
President

LESTER P. AURBACH
Executive Vice-President

EDWIN M. JOSEPH
Vice-President

STAFF

N. N. GOODMAN, JR.
General Manager

DAVID W. VEIT
Editor

PHILIP R. KALISCHER
Associate Editor

F. P. MIGNIN, JR.
Circulation Director

DISTRICT OFFICES

NEW YORK
LEE HAAS, Mgr.
ARTHUR L. GOEBEL
60 E. 42nd St.—Room 803
New York 17, New York
Murray Hill 7-3420

CLEVELAND
ROBERT SIMMONS
1240 Ontario St.
Cleveland 13, Ohio
SUperior 1-9622

CHICAGO
LLOYD WILLOUGHBY, Mgr.
KENNETH L. JONES
Suite 1613-1615
520 N. Michigan Ave.
Chicago 11, Illinois
WHitehall 3-1655-56-57

LOS ANGELES
ALAN CAZIER, Mgr.
Room 1001
3460 Wilshire Blvd.
Los Angeles 5, California
Dunkirk 9-9364

LONDON
JOHN A. LANKESTER
31 Palace St.
Westminster
London, S.W. 1, England

TOKYO, JAPAN
F. C. TAYLOR
American Trading Co. (Japan) Ltd.
No. 1 Shiba Park 7-Gochi
Minato-Ku, Tokyo

BPA

MEMBER mpa METAL POWDER ASSOCIATION

copyright 1955 by
The Industrial Publishing Group
Div. of Telenews Productions, Inc.
1240 Ontario St., Cleveland 13, Ohio

FEATURE ARTICLES

31 **PRODUCTS THAT MAY NOT FAIL—1.** Fire Extinguishers (Cover story)

32 **PRODUCTS THAT MAY NOT FAIL—2.** Aircraft Safety Device

34 **BRONZE DIE CASTINGS BY VACUUM**—complex castings in some tough alloys.

37 **TOY PARTS THAT MUST BE DIE CAST**—four classes of parts that require the physical properties of die castings.

43 **PUT POROSITY ONLY WHERE IT'S NEEDED.** Castings and powdered metal parts permit control of porosity.

45 **DON'T ASK FOR HIGHER PHYSICALS THAN YOU NEED**—it will save money.

52 **RADAR PARTS PRECIOUS METAL PLATED FOR CONDUCTIVITY.**

77 **CASTINGS FOR AIRCRAFT HYDRAULIC SYSTEMS**—A method of automatic permanent mold casting.

FINISHING SECTION

51 **HOW 40 HOLES AND 12 BOSSES ARE INSPECTED TO ±0.001 in 20 MINUTES.**

52 **RADAR PARTS PRECIOUS METAL PLATED FOR CONDUCTIVITY.**

54 **6 WAYS TO FASTEN DIE CASTINGS.** A PMM Round-up article.

REGULAR DEPARTMENTS

8 Between the Lines
16 Data in Ads
18 Patents
22 Casting About
47 People in the News
60 Useful Literature
65 New Products
71 Industry News
74 Opportunities

Subscription rates: United States and possessions — $5.00 per year; $8.00 for 2 years; Canada — $6.00 per year; Foreign — $7.00 per year; Subscriptions to the United Kingdom — £1.10 per year, payable in Sterling to our London office. Extra copies: 1 to 10 — 50¢ each; 11 to 25 — 40¢ each; over 25 35¢ each; Canada — 50c each; Foreign — 60c each. All subscriptions subject to individual acceptance by the publisher.

Published monthly. Accepted as controlled circulation publication at St. Joseph, Mich.

Please return 3579 forms to 1240 Ontario St., Cleveland 13, Ohio.

How to produce a Laboratory Scale to sell for only $29.50

CASE HISTORIES FROM MT. VERNON FILES

Manufacture a laboratory balance as accurate, as fine-looking as this Ohaus Cent-O-Gram* — capacity 311 grams, sensitivity to .01 gram — to sell for only $29.50? Realistically, you'd have said it was impossible — but here it it!

To produce such an outstanding value in a precision instrument requires all the top level design and production abilities that can be mustered. The two principal parts of this balance — base and support brackets — were designed to obtain all the advantages of die casting: — thin wall sections of great strength and rigidity, negligible machining, high speed production, low cost.

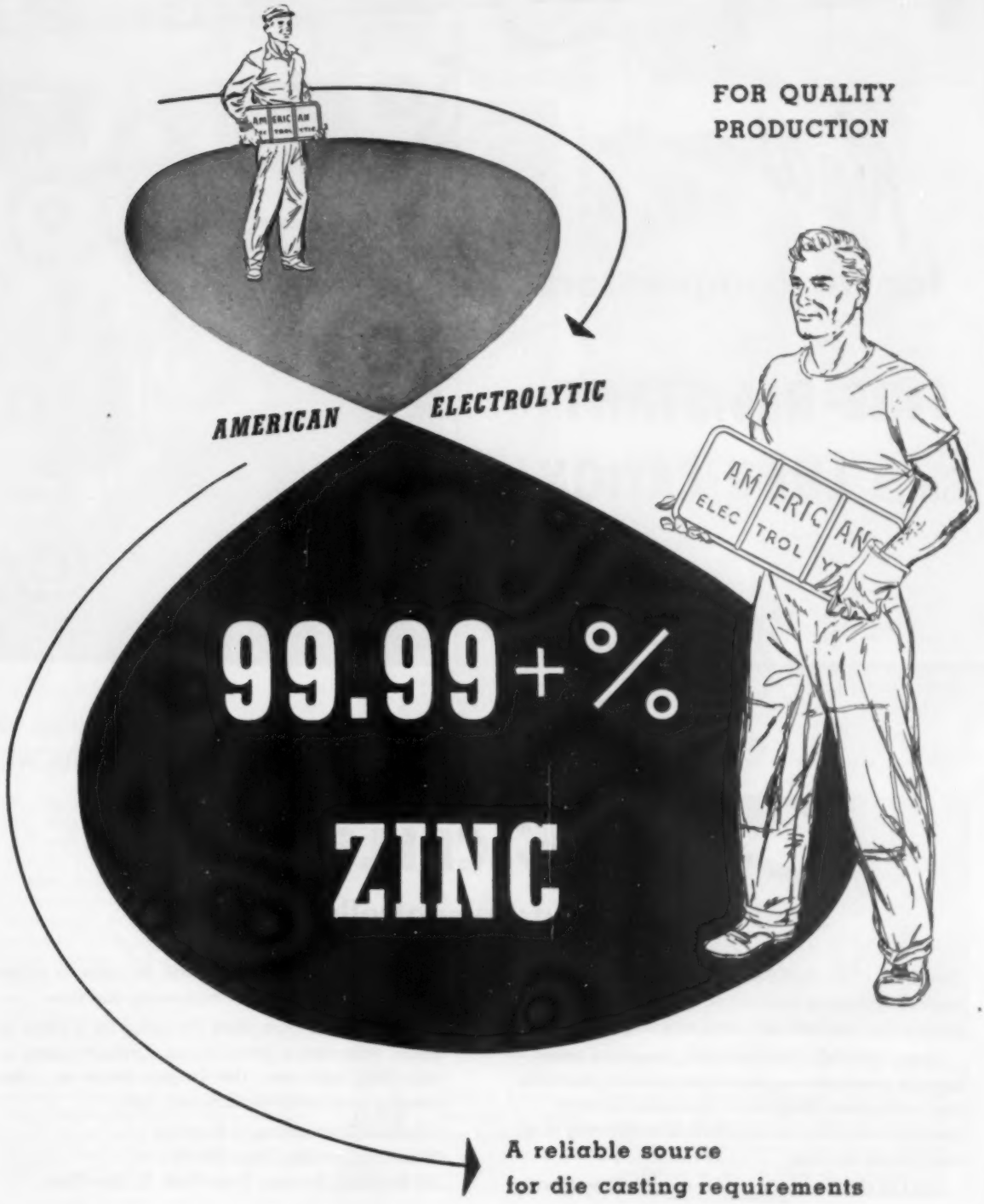
And low cost means low first cost too; that's why Mt. Vernon has been a constant supplier to Ohaus for many years. From die cost to finished casting, Mt. Vernon has both the complete die casting service and the facilities it takes to produce parts like these at minimum cost in any quantity. We have 162,000 square feet of the most modern equipment for making dies and for die casting aluminum and zinc. Mt. Vernon service comprises completely coordinated designing, die-making, casting, and machining, all under one roof.

It will pay you to bring your production specifications to us. We may show you, as we did Ohaus, the way to important cost reductions and improved products.

MT. VERNON
DIE CASTING CORP.
STAMFORD, CONNECTICUT

*Manufactured by Ohaus Scale Corporation, Union, N. J.

For more information circle No. 36 on the Reader Service Card



AMERICAN ZINC SALES COMPANY

Distributors for

American Zinc, Lead & Smelting Company

Columbus, Ohio • Chicago • St. Louis • New York

For more information circle No. 5 on the Reader Service Card

Battery of 1100 H.P. Worthington Compressors at Celanese petrochemical plant, Bishop, Texas, where CELLULUBE* 220 has given efficient service since 1952.

Celanese* CELLULUBE*s

synthetic lubricants in controlled viscosities

Celanese CELLULUBES have been developed to meet the pressing need for non-carbon-forming lubricants that are both safe and efficient.

These synthetic lubricants are phosphate esters—straight chemical compounds controlled to specification viscosities. They have excellent lubricity . . . are non-corrosive, non-reactive, non-oxidizing in air compressor service.

CELLULUBES are non-petroleum oils. They greatly reduce the formation of carbon deposits, a prime source of air compressor explosions and fires.

CELLULUBES have been job-tested for 3 years in actual compressor installations. Evaluate them in your own operation. Use coupon below to order samples and complete technical data.

Celanese Corporation of America
Chemical Division, Dept. 589-H
180 Madison Avenue, New York 16, New York.

Celanese Corporation of America, Chemical Division, Dept. 589-H
180 Madison Avenue, New York 16, N. Y.

Please send me sample and technical bulletin on Cellulube fire-resistant Synthetic Lubricants for air compressor service.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

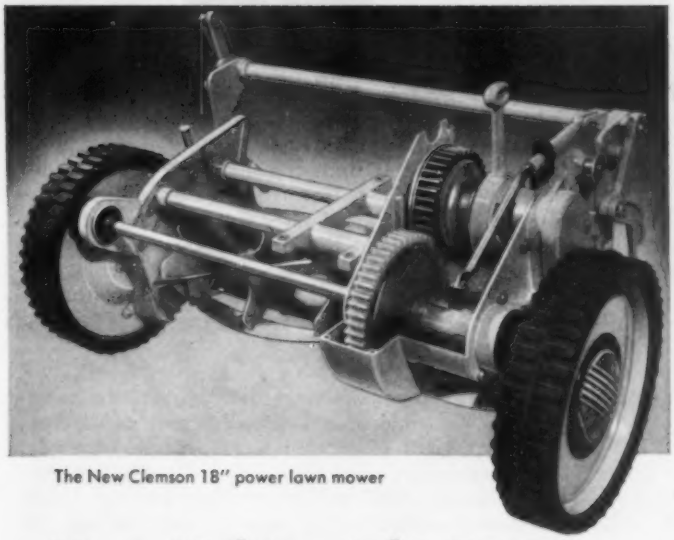
CITY _____ ZONE _____ STATE _____

Celanese* CHEMICALS

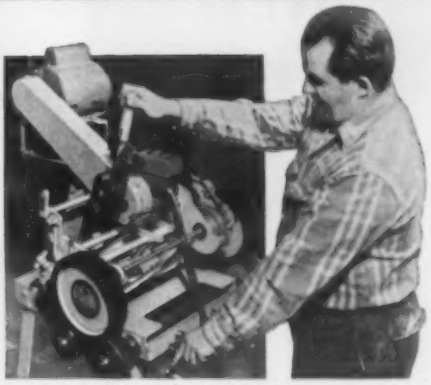
*Reg. U.S. Pat. Off.

For more information circle No. 14 on the Reader Service Card

DIE CASTING REPORT



The New Clemson 18" power lawn mower

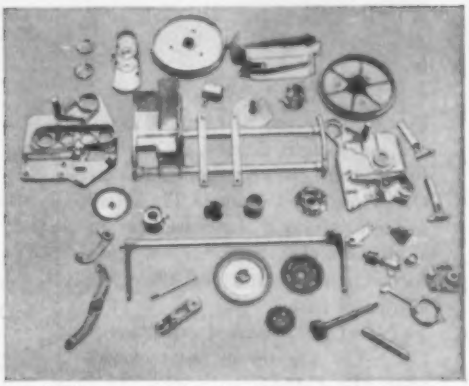


Testing die-cast clutches and cams

New Lightweight Power Lawn Mower---

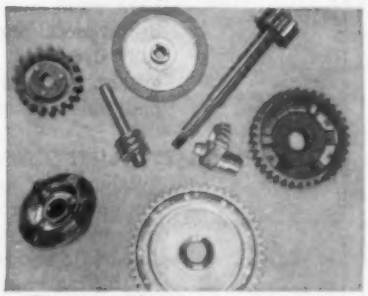
Utilizes 34 die-castings to cut production costs, assembly time and integrate parts

Die-cast gears, worms

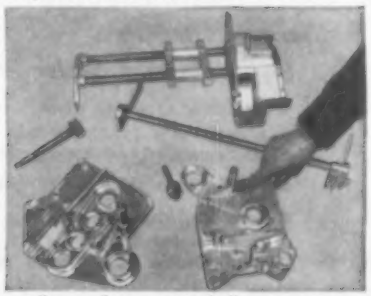


34 die-cast parts from 27 dies

No stranger to die-castings (having specified them successfully since the earliest 1937 model), Clemson Bros., of Middletown, N. Y., a leading lawn mower manufacturer, decided to go all out on their new power unit. Reason: Clemson found die-castings cut costs and could withstand functional shock, stress and strain. In addition, engineers had increased freedom in designing a more efficient, sales-appealing machine. Working closely with Precision die builders, they made maximum use of modern die-casting techniques to produce complicated steel inserts, worms, sleeves, gears, cam surfaces and achieve unusual contours. Majority of machining done by the die-caster simplified assembly of component parts, many of which were held to such close tolerances they could be used "as cast."



Die-cast steel inserts



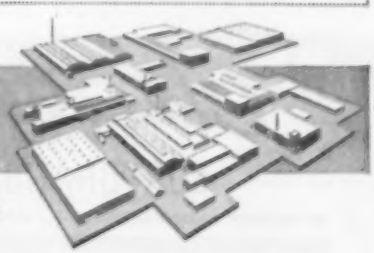
Cam surfaces cast in shells

Extensive Use of Functional Die-Castings Pays Dividends

If you are planning to design functional parts, why not look into the advantages of aluminum, magnesium or zinc die-castings. Precision's team of creative engineers will be glad to show you how this modern production process can help cut costs and supply unlimited number of identical parts, held to close tolerances. Write on your letterhead for a copy of "Die-Castings...Unlimited." Address: Precision Castings Co., Inc., 311 Walnut St., Fayetteville, N. Y.

PRECISION CASTINGS CO., INC.

World's largest independent producer: aluminum, magnesium and zinc die castings



FAYETTEVILLE, N. Y. — SYRACUSE, N. Y. — CORTLAND, N. Y. — NEW YORK, N. Y.
CHICAGO, ILL. — CLEVELAND, OHIO — KALAMAZOO, MICH.

For more information circle No. 41 on the Reader Service Card

New Luster-on Aluminum Sealer

Meets the Requirements of Government Spec. MIL-C-5541

From the makers of Luster-On, the original bright conversion coating for zinc and cadmium comes Luster-On Aluminum Sealer. This new sealer produces a chromate film on aluminum that provides excellent corrosion protection and can serve as a paint base.

Now government approved, Luster-On Aluminum Sealer meets Spec. MIL-C-5541.

Specify Luster-On Aluminum Sealer for:

- Replacing anodizing where hardness is not a prime factor . . . eliminating expensive equipment.
- Salt spray resistance to 600 hours.
- Easy application in one dip at room temperature . . . clear to yellow-brown colors from the same bath.
- Excellent adherence . . . does not leach easily.
- Extreme economy for user.

Send samples today for free laboratory treatment. See superior results with your own eyes.

THE *Chemical* CORPORATION

66 WALTHAM AVENUE, SPRINGFIELD 9, MASS.

Circle No. 55 on the Reader Service Card

BETWEEN THE LINES

FASTEN DIE CASTINGS by any of the high speed fastening methods and you'll save money. Too few designers give thought to the fastening and assembly of their products, but leave it until the operating features are completely detailed. However, if the method of assembly is studied at an early stage of design, it may be possible to save a lot of production time and dollars. After all, there are a number of fastening devices that are specifically for this type of casting. A round-up report appears in this month's Finishing Section of PMM.

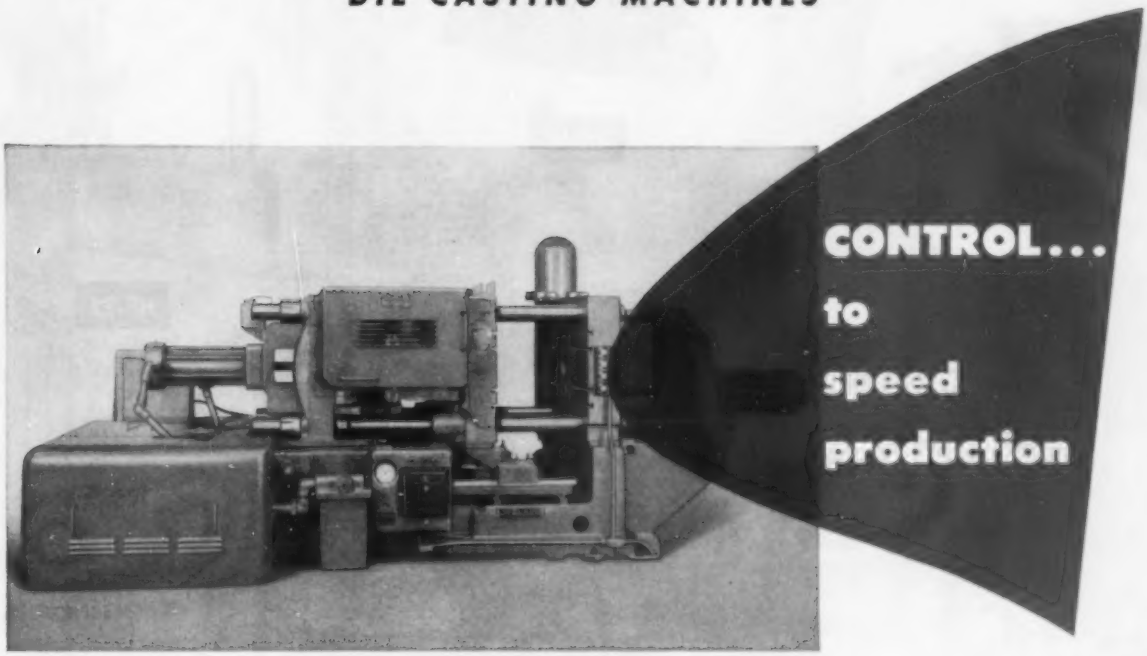
NEW CASTING PROCESSES are making their appearance nowadays as new materials and techniques make them possible. Most effort is being spent in obtaining greater accuracy, smoother surfaces, and more complex shapes. PMM will try to keep you up-to-date on new techniques. We recently reported on the Ellis process, and have articles for your information in this and near-future issues on a new permanent mold casting process, Ceramicasting, and vacuum die casting in aluminum bronzes. Each casting process has its specific advantages and limitations, each has a range of usefulness for the product designer.

MORE THAN ONE of the precision metal molding processes are likely to be found in today's products. This is borne out by an article on page 43 describing an impact tool that is built principally of die castings, permanent mold castings, plaster mold castings and powdered metal parts. Each one has a certain advantage and use-factor for one or more components. Together, they make a product that is accurate, dependable and low cost.

DEPENDABILITY PLUS! That's the requirement of a fire extinguisher. You never get a second chance if your fire extinguisher doesn't work the first time. That's why manufacturers of this type of equipment have to be so careful about their choice of materials. Ansul, one of the big names in fire prevention, has used die castings in various fire extinguishers for years. The new 10-pound unit that Ansul has recently put on the market makes important use of die cast parts, as reported in this issue of PMM.

OVER-DESIGN IS A HEADACHE. How many dimensions are specified closer than they need to be? How many materials indicated in the drawing are tougher or stronger than the actual requirements? It's a common engineering error that costs manufacturers untold thousands of dollars. Why specify high physicals for a part that is non-functional . . . just because it was originally machined from wrought stock that had higher-than-needed properties. A case in hand is some simple spacers, once machined, but now made by powder metallurgy techniques. The story is in this issue of PMM.

REED-PRENTICE
DIE CASTING MACHINES



Simplified controls for steady, high-output production

Your machine operator will turn out consistent, high-level production on a REED-PRENTICE Die Casting Machine. These machines are designed for easy, safe operational control. Here are some of their features:

1. Central operator's station controls movement of die, plunger and cores Equipped with easy-to-operate lever-type push-buttons
2. Convenient foot switch controls ejection plunger on cold chamber machines
3. Automatic electric timers control machine cycle
4. Lever on control station actuates core pulling cylinders when they are used
5. Machines may be set for manual or semi-automatic operation

Write for your free copy of booklet describing these and many other features of REED-PRENTICE Die Casting Machines

REED-PRENTICE CORP.

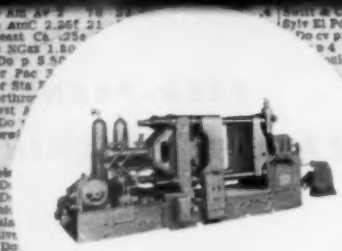
WORCESTER 4, MASSACHUSETTS
Affiliate of **PACKAGE MACHINERY COMPANY**

REPRESENTATIVES: Houston—Steel & Machine Tool Sales Co.; Seattle & Spokane—Star Machinery Co.; Minneapolis—Chas. W. Stone Co.; Los Angeles—Western Molders Supply Co.

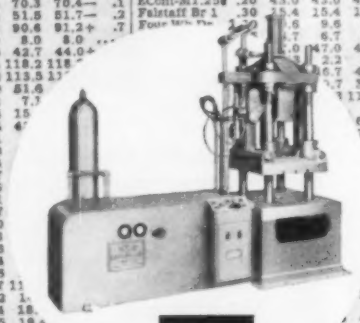
BRANCH OFFICES: 75 West St., New York 6, N. Y.; 1213 West 3rd St., Cleveland 13, Ohio; 4001 N. Elston Ave., Chicago 18, Illinois; 2842 W. Grand Blvd., Detroit 2, Michigan.

For more information circle No. 43 on the Reader Service Card

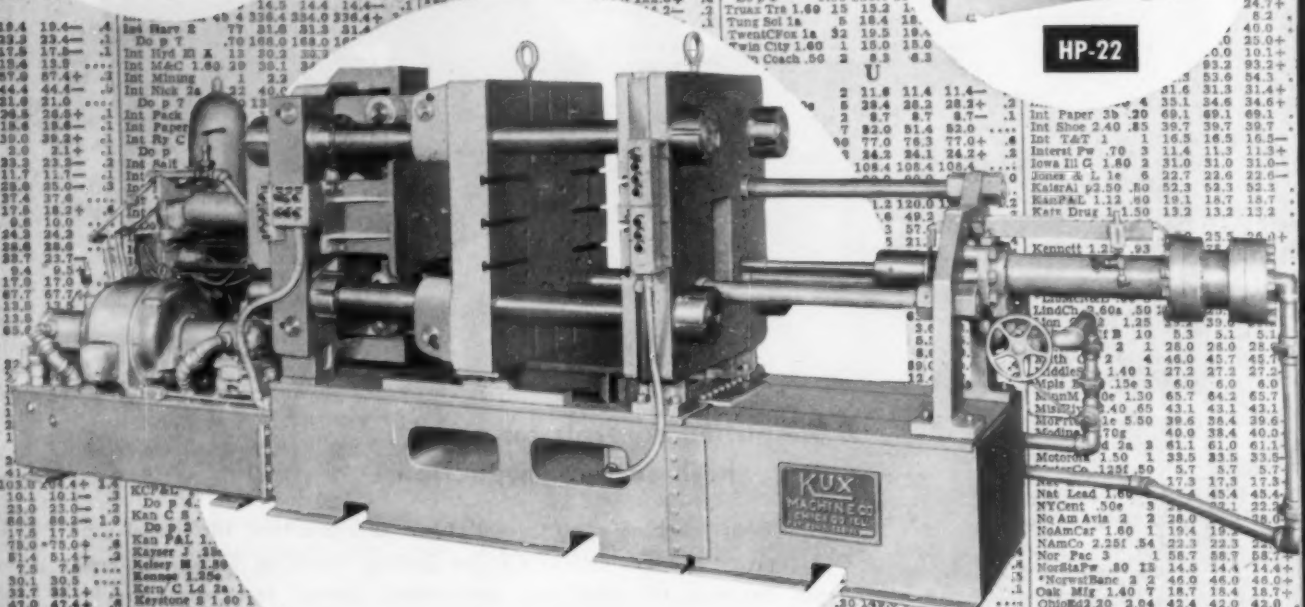
HP-25



BH-40

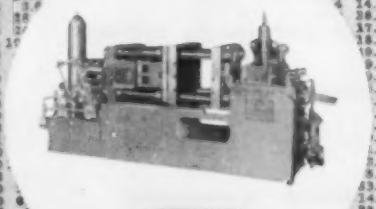


HP-22

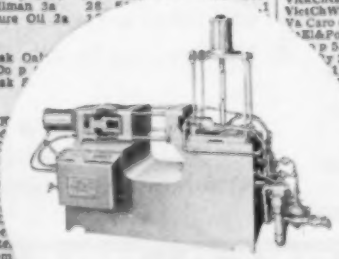


HP-37

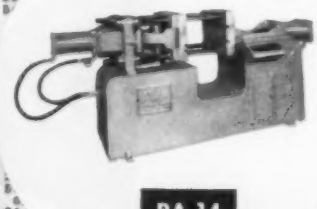
Hydraulically operated cold chamber machine. 600-ton pressure. Die space between bars 26½ x 20½. Die separates 18".



BH-18



K-5



BA-14

Just a few of the many hundreds of famous name users of Kux Die Casting Machines

• Allegheny Ludlum Steel Corp. • Burroughs Corp. • Casco Products Corp. • Dormeyer Corp. • Electric Auto-Lite Co. • Belden Mfg. Co. • General Electric Co. • General Motors Corp. • Hood Rubber Co. • International Harvester Co. • Lionel Corp. • McGraw Electric Co. • The Maytag Co. • Independent Lock Co. • The Yale and Towne Mfg. Co.

Blue chip users of

KUX die casting machines

...our stock in trade

There are excellent reasons why so many famous companies prefer KUX Die Casting Machines with their built-in points of superiority. KUX machines, year-in-year-out with minimum maintenance cost, produce castings having unexcelled structural density and hardware quality finishes.

Whatever your die casting production problem, there is a KUX machine to fit your needs . . . whether it's for huge castings weighing 35 pounds or more . . . or for tiny hard-to-cast parts in any of the alloys of zinc, aluminum, magnesium, brass, tin or lead.

Every KUX model reflects the skill and knowledge gained in 35 years of serving as a leader in the development of die casting as an industry. This long association has enabled KUX to engineer machine design superiorities in its full range of models, a few of which are described and illustrated here.

HP-25 Hydraulic cold chamber machine for aluminum, brass or magnesium castings. 400-ton pressure.

BH-40 World's largest standard plunger goose neck machine. 800-ton die locking pressure.

HP-22 Vertical type cold chamber for production of parts having cast-in inserts. 400-ton pressure.

BH-18 Plunger goose neck type with self-contained melting pot and furnace. 400-ton pressure.

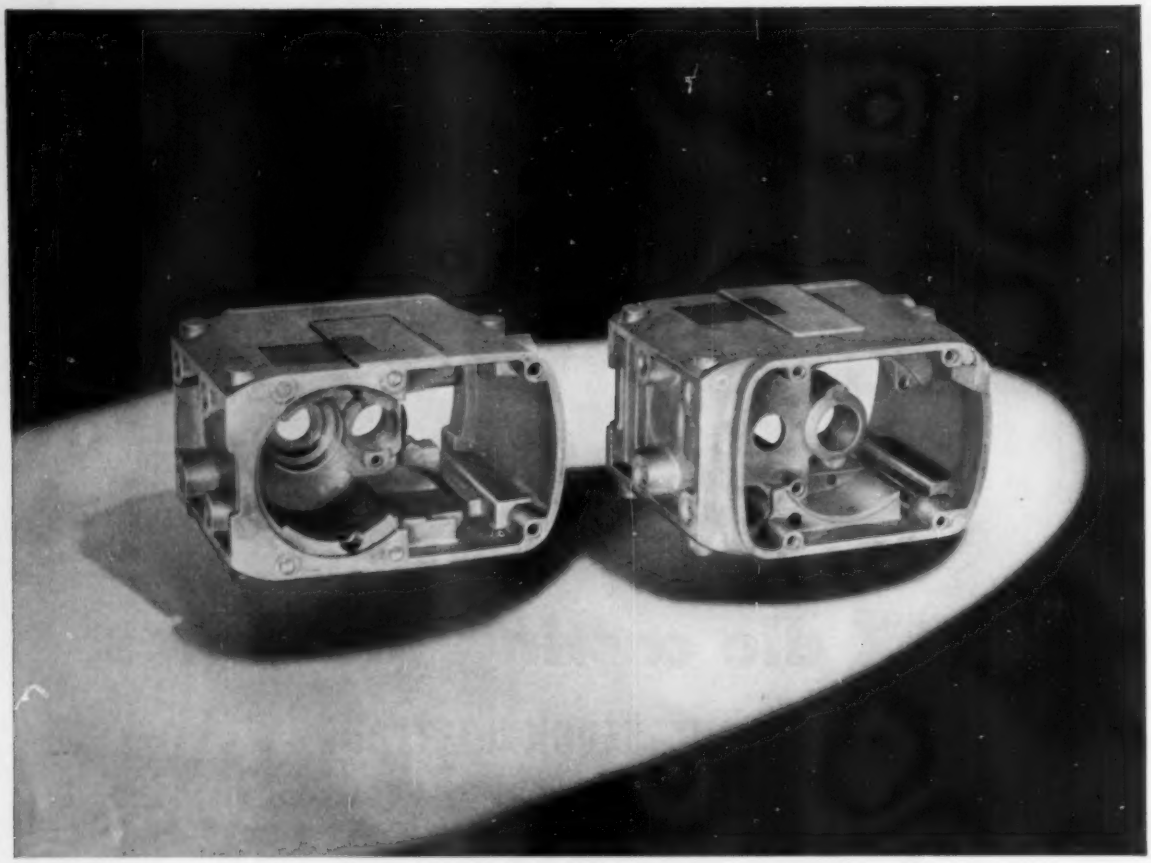
K-5 Air operated for smaller castings at very rapid speed of production. 25-ton pressure.

BA-14 Air operated cold chamber machine using moderate injection pressure for brass, aluminum or magnesium. 80-ton locking pressure.

KUX Machine Company

6725 NORTH RIDGE AVENUE • CHICAGO 26, ILLINOIS

For more information circle No. 28 on the Reader Service Card



PARKER'S MOST IMPORTANT PRODUCT:

Proving That Die Casting Cuts Component Parts Costs

PARKER
SALES ENGINEERS

CHICAGO 49, Ill.
Ollie J. Berger Company • 2059 East 72 Street

CINCINNATI, Ohio
William H. Brosterman • 2174 Buck Street

DETROIT 35, Mich.
Hodgson-Geisler Co. • 18917 James Couzens

GIRARD, Penna.
Daniel F. Marsh • 35 Chestnut Street

KIRKWOOD 22, Mo.
Edward F. Higgins, Jr. • 102 West Adams Street

WILTON, Conn.
Girard L. Palmer • Belden Hill Road

SYRACUSE, N. Y.
J. C. Palmer • 712 State Tower Bldg.

BELLEFONTE, Penna.
Warren G. Olson • 420 East Linn Street

A sure way to cut component parts costs is to eliminate production operations. In the above part, note the involved coring and other design elements . . . especially the precisely positioned laminated steel insert. This intricate part with the insert cast into place was produced in **one die casting operation** by Parker. A good example of how Parker Die Casting produced component parts to exacting "specs" with a minimum of operation, and, therefore, at lowest possible cost.

The cost and design advantages of Parker Die Castings may save you money on your component parts. It will be worth your while to check. Just call the nearest Parker Sales Engineer listed here or write the factory direct.

Parker White Metal Company • 2153 McKinley Ave., Erie, Pa.

PARKER

ALUMINUM and ZINC die castings
POWDERED METAL PARTS

For more information circle No. 39 on the Reader Service Card

cut downtime; avoid damaged dies.

When you use Die Slick, you insure your operation against the many high costs of down-time. Die Slick prevents sticking, soldering, ejector pin wear, and die damage. On difficult jobs, it often makes the difference between failure and success. We are confident that a week's trial in your shop will show you how Die Slick pays off in more production and better quality. To be sure we send you the most effective grade of Die Slick, please specify the metal or alloy you're casting.

DIE SLICK®

used by die casters everywhere

G. W. SMITH & SONS, INC., 5400 KEMP ROAD, DAYTON 3, OHIO

For more information circle No. 45 on the Reader Service Card

Relay Frame made by Madison-Kipp for Westinghouse Air Brake Company, Union Switch and Signal Division.

ADDED DESIGN POWER with MADISON-KIPP zinc and aluminum die castings

Your design problems require your own special talents. Die casting is a unique art in which Madison-Kipp mechanics are seasoned and skilled. By combining these talents the resulting design power is raised to a high degree.

The difficult die casting with 2 steel inserts here illustrated was developed and produced with the close cooperation of the user and the die designer.

Please clip this ad as a reminder to contact us when you have die casting requirements.

kipp

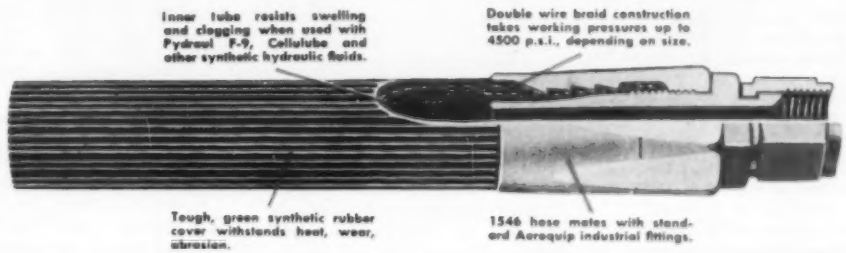
MADISON-KIPP CORPORATION
213 WAUBESA STREET • MADISON 10, WIS., U.S.A.

• Skilled in Die Casting Mechanics • Experienced in Lubrication Engineering • Originators of Really High Speed Air Tools

For more information circle No. 30 on the Reader Service Card

Reduce Fire Hazard!

New! Aeroquip 1546 High Pressure Hose for FIRE-RESISTANT Hydraulic Fluids


Inner tube resists swelling and clogging when used with Pydraul F-9, Cellulube and other synthetic hydraulic fluids.
Double wire braid construction takes working pressures up to 4500 p.s.i., depending on size.
Tough, green synthetic rubber cover withstands heat, wear, abrasion.
1546 hose mates with standard Aeroquip industrial fittings.

Highly recommended wherever hydraulic lines are used in plant "hot spots" are the new synthetic, fire-resistant hydraulic fluids. Aeroquip's new 1546 hose has been specially developed to carry these synthetic fluids without swelling or clogging.

The money-saving opportunities are immediate, because increased plant safety means reduced fire insurance premiums in many instances.

Other Aeroquip advantages: 1546 hose mates with standard Aeroquip reusable fittings. Hose assemblies can be made by your own personnel, right in your plant. A small inventory of bulk hose and fittings can meet your replacement line needs. And Aeroquip flexible hose can be installed in a fraction of the time required to form and fit rigid tubing. Write for complete information.

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

For more information circle No. 8 on the Reader Service Card

DATA OFFERED IN THIS MONTH'S ADS

to get any of the free materials described here, circle the appropriate number on the reader service cards bound into this issue

2. BETTER ALUMINUM CASTINGS: result from the use of a dispersion of vermiculite in water as an insulating mold wash in permanent mold castings. Bulletin No. 425-S10 from Acheson Colloids describes the uses and advantages of dispersion No. 193.

8. SPECIALLY DESIGNED high pressure hose for carrying the new fire-resistant hydraulic fluids used in plant hot-spots are fully described and the reasons for their use given in technical reports available from Aeroquip Corp.

10. GREATER FLEXIBILITY in metal powder presses is claimed for the new units made by Baldwin-Lima-Hamilton. Two bulletins, 3101 (C) and 3104 (L), fully describe and illustrate these machines.

12. HYDRAULIC FLUIDS that are fire-resistant and still surpass petroleum base hydraulic fluids in properties are described in a booklet, No. 7380, available from Carbide & Carbon Chemicals Co.

13. EXTRA HEAVY, all-steel linkage is said to be one of the bonus features of Cast Master die casting machines. Full description of this and other features of these machines are included in the new Cast Master catalog.

14. SYNTHETIC LUBRICANTS that are fire-resistant and of controlled viscosity are described in technical bulletins and data sheets published by the Celanese Corp. of America.

15. STAINLESS AND OTHER STEELS in investment castings are the subject of one of the many publications of the Crucible Steel Co. of America. The Crucible Publication Catalog is a guide to determine which bulletins you want.

11. CONTROLLED METAL ANALYSIS is made more certain through the use of MasterMet certified alloys. A bulletin giving the chemistry and other important properties of these alloys is available from Cannon-Muskegon Corp.

16. HIGHEST PRECISION TOOLING is required for the newest metal-working methods such as powder metallurgy. A bulletin from Cleveland Tool & Die Co. for engineers and executives gives much basic information on tooling design and construction.

18. METAL PLATING AND FINISHING in all of its phases is covered by one of the many products developed by Enthone, Inc. tabulated in the company's publication check list.

19. METAL POWDERS AND METAL OXIDES carefully prepared to meet every requirement for uniformity, purity, consistency, etc. are described in technical data available from the Glidden Co.

20. DIE CAST FASTENERS, pre-threaded and ready for use are described in a booklet that also tells how Gries Reproducer Co. can cut your fastener costs.

21. ZINC & ALUMINUM FLUXES for use with all alloys and to help secure complete alloy control are described in a bulletin from Haviland Products Co.

22. INFORMATION ABOUT ALLOYS is in the Henning Messenger, published monthly by Henning Bros. & Smith, Inc.

25. DESIGNING WITH POWDER METALLURGY is the subject of the newest literature "package" that has been prepared by the Hoeganaes Sponge Iron Corp.

27. HEAT EXCHANGERS and die casting machines are the subject of bulletin I.I K5 that has been published by Kewanee-Ross Corp.

29. DESIGN FOR DIE CASTING in aluminum and magnesium is the subject of published material that is available from Litemetal Dicast, Inc.

31. CONVEYING SYSTEMS specifically designed for handling hot metal parts and scrap as well as for standard conveyor uses are described in a catalog that has been published by May-Fran Engineering, Inc.

38. DESIGN DATA to help get the most out of your zinc die castings is offered by New Jersey Zinc Company who have an authoritative brochure including design tips.

40. GEARS AND RACKS for die casting and permanent mold casting machines are produced to specification by Peerless Gear & Machine Co. A brochure is available describing the facilities.

41. "DIE CASTINGS — UNLIMITED," a new booklet, has been issued by Precision Castings Co., Inc. Write on your letterhead for a copy.

42. CASTING WAXES specifically for the investment casting industry and allied applications are described and all of the needed technical data given in literature available from the Petrolite Corp.

43. DIE CASTING MACHINES that incorporate the latest advances in the art are illustrated and all operating and physical data given in the new Reed-Prentice Corp. catalog.

44. MACHINING ALUMINUM to secure the best finished product at the lowest cost is the subject of a new booklet from the metallurgical department of the Geo. Sall Metals Co., Inc.

46. ECONOMICAL POWDERED METAL production on the new F. J. Stokes Machine Co. presses is described in three booklets recently published. The process, the presses and the tools are all described.

47. AMORPHOUS SILICA in the particle size range of from 1 to 15 microns (98 percent minus 10 microns) is now available. Prices, samples, and complete specifications are available from Tamms Industries, Inc.

51. POWDERED METAL PARTS can show drastic decreases in production costs. How, where, and when to apply them is told in a booklet that has been issued by Yale & Towne Mfg. Co., Powdered Metal Products Div.

53. FINISHING LIGHT METAL PARTS is simple, economical and a lasting finish secured with Iridite, described in technical data from Allied Research Products, Inc.

54. REDUCE DRILLING COSTS with the Bellows drill press feed. A new sixteen page brochure has been published that describes some of the many ways in which these units are cutting costs.

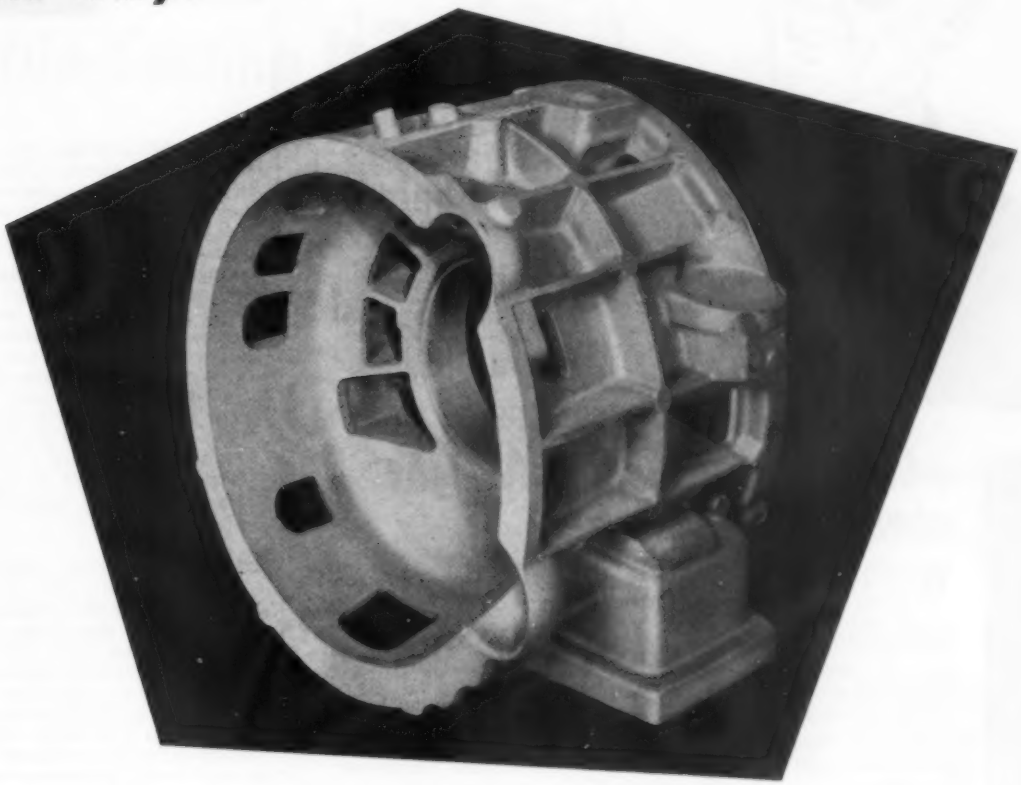
56. INCREASE PRODUCTION and cut costs through the use of spray painting masks and associated equipment. Literature on masks, mask washers, clamps and fixtures, etc. is available from Conforming Matrix Corp.

58. AUTOMATIC DEBURRING of holes with the new Noburmatic Tool is fully described and illustrated in a bulletin from Nobur Mfg. Co.

59. STRIPPING PAINT in the best and most economical manner is the subject of a new booklet issued by Oakite Products, Inc.

62. RESISTANCE MELTING FURNACES can mean lower costs per pound of finished casting. When, where, and how to use this type of melting furnace is described in bulletin No. 320 from Lindberg Engineering Co.

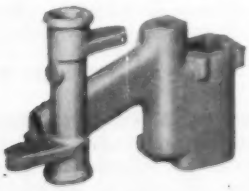
this is the aluminum industrial converter housing they said couldn't be cast this way!



Every company at some time accomplishes a difficult task that brings real satisfaction to everyone. Such is the case with the 65 pound semi-permanent mold casting shown above made for a division of an automotive major. One of our respected competitors said, "It can't be done that way." The casting buyer said, "It's got to be done." We did it, delivered it ahead of schedule, and the costs were right. Everyone was happy about the job.

Centr-O-Cast manufactures a complete range of aluminum castings in the permanent mold, semi-permanent, centrifugal, and centrifuge fields ranging in weights from 2 ounces to 65 pounds. All alloys are used, either regular or heat treated. Operating at the rate of 750,000 pounds of finished castings per month Centr-O-Cast ranks as one of the larger permanent and centrifugal casting foundries in the country.

Next time your drawings call for aluminum we would like to help. A card will bring an illustrated brochure, or, if you prefer, a personal call by our casting consultant.



Small permanent mold aluminum castings which proved that quality need not be expensive.

centr-o-cast

CENTR-O-CAST AND ENGINEERING COMPANY

45 St. Jean Avenue, Detroit 14, Michigan

For more information circle No. 63 on the Reader Service Card

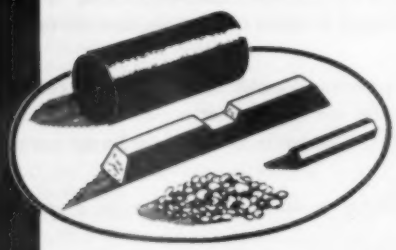
Here's help for exacting engineers and production men . . .

who must be absolutely right about metal analysis

WITH each MasterMet alloy you buy, Cannon-Muskegon gives you a certified, notarized analysis . . . black-on-white proof that MasterMet alloys are produced exactly to your specifications. This assures close predictable control of physical and chemical characteristics for any end-use. You can be confident that the results you plan — the performance you call for will be delivered in parts made with MasterMet alloys.

You can choose from a wide range of high alloys including cobalt-base and nickel-base alloys, chromium and chromium nickel stainless steels. Also included are such special alloys as Monel*, Inconel*, Invar, Ni-Resist*. Order these types or your custom specifications from Cannon-Muskegon.

*Trademark — International Nickel Co.



FOR REMELT OR PROCESSING

MasterMet alloys are available in shot, ingots and cast billets, bars and special shapes. Often the more common low alloy and 300 and 400 Series stainless steels can be shipped from stock. Remember . . . whatever your needs, Cannon-Muskegon can provide metallurgical engineering assistance in recommending the proper alloy — as well as the proper handling — to assure the best possible casting. Write for bulletin!

Cannon-Muskegon
CORPORATION
2871 LINCOLN STREET • MUSKEGON, MICHIGAN

ARE YOU ON OUR MAILING LIST

to receive inventory data on "in-stock" alloys? You'll find a surprising number of alloys listed ready for immediate delivery. Write today!

MASTERMET
CERTIFIED ALLOYS FOR INDUSTRY

For more information circle No. 11 on the Reader Service Card

A review of recent U.S. PATENTS

DEW POINT APPARATUS: A device in which water at its maximum density is circulated under a cooling plate located in an enclosed chamber. The chamber is provided with a means of introducing a gas sample and also a means of increasing the pressure of the gas. In use, a gas sample is introduced and the pressure increased until a visible "dew" appears on the cooling plate. Measurement of the gas pressure can then be related to the dew point of the gas at atmospheric pressures.

(Patent No. 2,709,360 — Dew Point Measuring Apparatus — John R. Boyle — assigned to Illinois Testing Laboratories — issued May 31, 1955).

CONTROLLING THE DENSITY OF SINTERED COMPACTS: The powder is mixed with 35 to 50 percent of a heat-fugitive depolymerizable Polymono-olefinic resin. The mixture is heated to sintering temperature in a reducing atmosphere using a rate of atmosphere flow past the compacts that is below the turbulent rate and so that the volatilized binder in the emergent gas stream does not exceed 75 percent by volume.

(Patent No. 2,709,651 — Method of Controlling the Density of Sintered Compacts — Raymond S. Gurnick and Robert T. Joy — assigned to Thompson Products, Inc. — issued May 31, 1955).

PROCESSING IRON-CONTAINING MATERIAL: A method of utilizing material containing iron oxide and other metals such as nickel, copper, etc. The iron oxide is reduced to iron and the iron nodulized by heating in an oxidizing atmosphere in the presence of a carbonaceous material.

(Patent No. 2,709,650 — Method of Processing Iron Containing Materials to Nodules — Friedrich Johannsen — issued May 31, 1955).

A PROCESS of producing a smooth, lustrous surface on aluminum or aluminum rich alloys. The article to be polished is immersed in an electrolyte composed by weight of 45% to 80% ortho-phosphoric acid, 5% to 20%

Continued on page 21

Let **DOLLIN** Engineers

Get the most out of your Die-Casting Designs

—at the lowest possible cost!

LARGE CASTINGS

Aluminum castings made on large cold chamber type high-pressure machines. Large zinc castings made on large plunger type machines.

SMALL ZINC CASTINGS

1000 per lb. to 3 per lb., made on fully-automatic machines. More design latitude than other high-speed methods—attractive tool costs and piece prices.

Send blueprints, specs or samples of your parts to Dollin for study and quotation, without obligation.

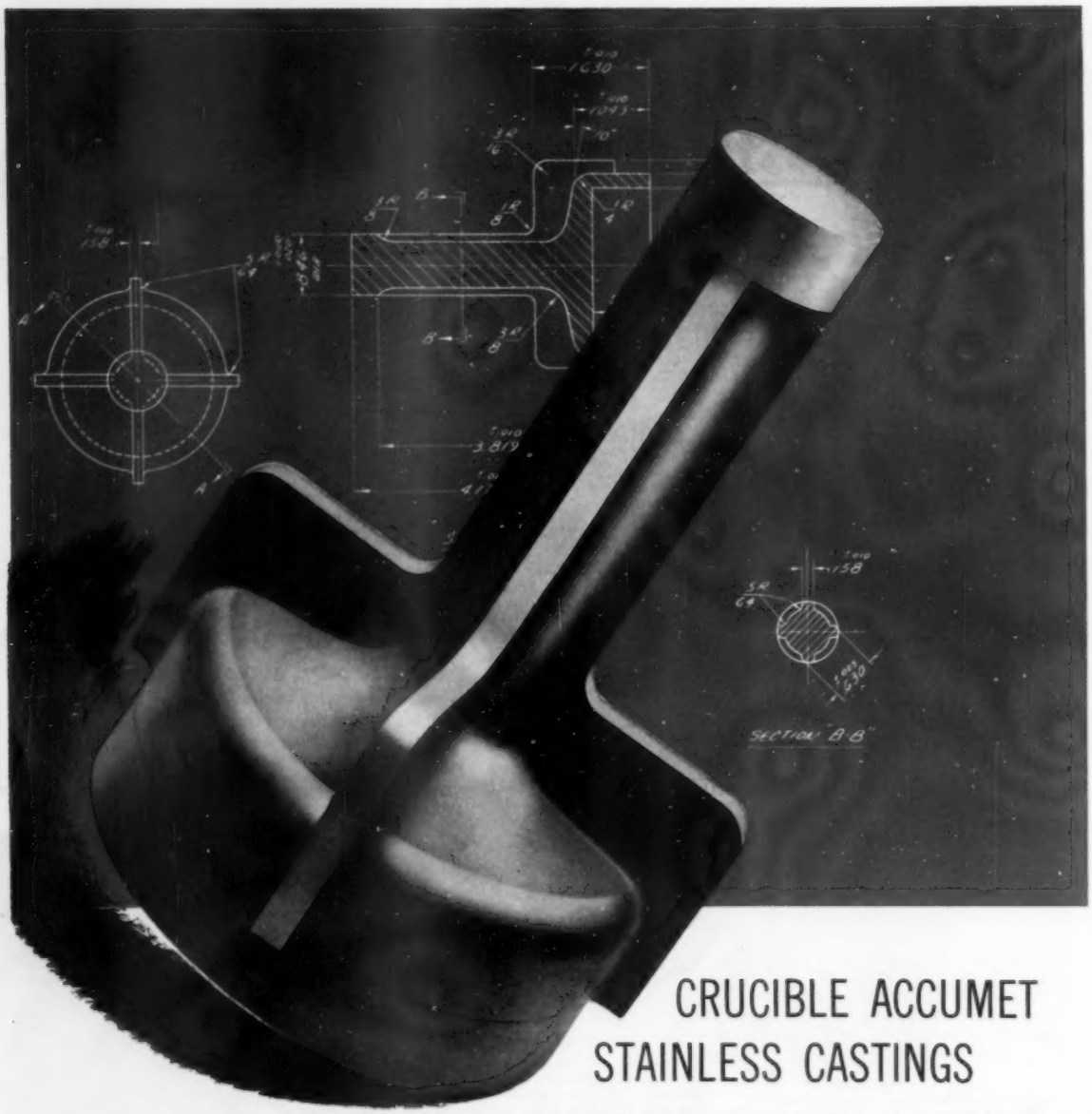
Based on more than 25 years' experience with thousands of die-cast parts and problems, most likely suggestions can be made that will cut piece costs—include fastening elements—reduce machining and assembly operations—increase strength—or improve appearance.

DOLLIN Zinc and Aluminum **DIE-CASTINGS**

Dollin Corporation 614 So. 21st St., Irvington 11, N. J.

SALES OFFICES: Boston • Buffalo • Canton • Charlotte • Chicago • Detroit • Louisville • Philadelphia • Pittsburgh • St. Louis • St. Paul

For more information circle No. 17 on the Reader Service Card



CRUCIBLE ACCUMET STAINLESS CASTINGS

provide smoother surfaces . . . closer tolerances — cut finishing costs

Even intricately shaped parts, like this cream separator neck piece, can be used essentially as-cast when produced by the ACCUMET method. That's because ACCUMET casting employs hot molds with special inner linings. You get castings on which thin sections are minutely defined . . . and with exceptionally fine surface finish. *Costly finishing operations are practically eliminated.*

On this stainless steel part, for example, the only finishing operations necessary are drilling and tapping of the stem section, grinding flats on the bow end, and polishing.

To minimize finishing operations on your products, consider the advantages of ACCUMET precision investment castings. Let your Crucible representative show you how their close tolerances, fine finish, and physical and metallurgical accuracy can spell substantial savings for you. And — to see what information is available on these and other Crucible special steels, write for your free copy of the "Crucible Publication Catalog." *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

For more information circle No. 15 on the Reader Service Card

PATENTS
continued from page 18

sulfuric acid, the total of the two acids being not more than 90% of the electrolyte.

From 3% to 15% of an organic compound from the group of aliphatic poly-alcohols and ether-alcohols soluble in phosphoric acid, the balance water. The bath is operated at from 60C to 100C. The article is lightly etched in the bath and then made the anode in a direct current circuit.

(Patent No. 2,707,655—Electrolytic Polishing of Aluminum—Hubert Laurence Turner, assigned to Union Carbide and Carbon Corp.,—Issued May 17.)

A DUSTLESS, free flowing, non-tacky molding sand in which each sand particle is coated with and completely enveloped by a blended dual-layer hard film that is non-tacky at room temperatures. The film is composed of an inner an outer layer of heat liquefiable layer of thermosetting resin and waxy material. From 2% to 4% of resin by weight of sand is used and from 0.5% to 8% of waxy material by weight of resin. The waxy material has a melting point at least that of the resin and is insoluble in the resin in the solid state.

(Patent No. 2,706,163—Coated Sand and Method of Producing the Same—Chester W. Fitko—issued April 12, 1955).

A PROCESS of electrolytically stripping chromium, nickel and copper from zinc base alloys. The part to be stripped is made the anode in an electrolytic cell, the solution in which is composed of 10% to 30% by weight of phosphoric acid, 30% to 55% by weight of sulfuric acid and from 0.1% by weight to saturation of chromic acid. The plating is stripped from the zinc base object and a film formed on the zinc surface to protect it from corrosion.

(Patent No. 2,706,171—Stripping Chromium Plating from Zinc Electrolytically — Raymond W. Goral, and Robert Goral; assignors to Enthone, Inc.—issued April 12, 1955).

(Copies of all patents can be secured from the U. S. Patent Office, Washington, D. C. for 25c each.)

For Dependable Protection on Die Casting Industry's Hydraulic Equipment

MARVEL SYNCLINAL FILTERS

SUMP TYPE (cutaway)

OVER 600 Original Equipment Manufacturers Install Marvel Synclinal Filters as Standard Equipment

LINE TYPE (cutaway)

Hydraulic Oils MUST BE CLEAN to Protect Equipment— Increase Production— Reduce Maintenance

PRODUCTION ENGINEERS and MAINTENANCE MEN, whose job it is to keep production machinery operating at peak efficiency, are specifying Marvel Synclinal Filters on new equipment and standardizing with Marvels throughout their plants.

It's The ACTIVE Filtering Area That Counts!

The Synclinal design of Marvel Filters provide that all-important balance between maximum ACTIVE filtering area and sufficient storage capacity for filtered out particles. Thus, longer periods of productive operation are attained before filter cleaning is necessary. Marvel Synclinal Filters are easy to clean because both the sump and line type may be disassembled, thoroughly cleaned and reassembled in a matter of minutes. Line type operates in any position and may be serviced without disturbing pipe connections.

A SIZE FOR EVERY NEED

Available for sump or line installation in capacities from 5 to 100 G.P.M. Greater capacities may be attained by multiple installation (as described in catalog). Choice of Monel mesh sizes range from coarse 30 to fine 200.

FILTERS FOR FIRE-RESISTANT HYDRAULIC FLUIDS

Marvel's most recent developments is a filter for the efficient filtration of all types of fire-resistant hydraulic fluids.

WATER FILTERS

Both sump and line type filters have been adapted for use in all water filtering applications. No changes have been made in the basic, balanced synclinal design.

VISIT OUR EXHIBIT
Booth #809
at the PRODUCTION ENGINEERING SHOW
Navy Pier - Chicago, Ill.
SEPTEMBER 6 to 16
SEE Marvel Synclinal Filters in Action!

Catalogs containing complete data available on request

IMMEDIATE DELIVERY!
As in the past, Marvel continues to offer Immediate Delivery!

MARVEL ENGINEERING COMPANY
625 W. Jackson Blvd., Chicago 6, Ill.
Phones: FRANKLIN 2-3530 & FRANKLIN 2-4431

PMM-8

Without obligation, please send me complete data on Marvel Synclinal Filters, as indicated:—

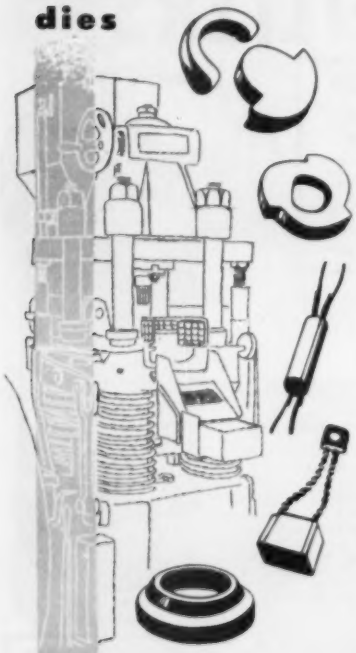
- ☐ Catalog No. 105—For Hydraulic Oils, Coolants and Lubricants
- ☐ Catalog No. 300—For WATER
- ☐ Data on filters for Fire-resistant hydraulic fluids.

Name .....
Title .....
Company .....
Address .....
City .....
State .....

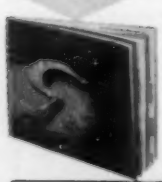
PRECISION

"Know-how"

in building high production compacting dies



Our experienced engineering skill is available to any firm working with the newest phase of metal-working — *powdered metal and ceramics* . . . particularly where Tungsten Carbide is used for absolute uniformity, precision tolerance stability and sound engineering design.



This new brochure is a "must" for engineering and production executives — write for your copy today.

CLEVELAND TOOL AND DIE COMPANY

1643 EDDY ROAD • CLEVELAND 12, OHIO

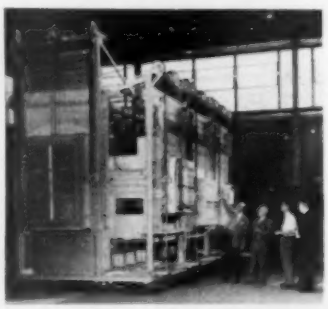
For more information circle No. 16

CASTING ABOUT

FAST HEAT RECOVERY is the secret of this hot sealer for cold wraps. In packaging frozen foods and other cold products, the ability of the sole plate to regain lost heat rapidly is an important feature. This unit, called the "Flaming Feather" by Lewsyth Packaging Systems and Equipment who distribute it, makes use of the advantages of a die cast aluminum sole plate with cast-in heating element for effective operation. The intimate contact of heating element with the die cast metal insures instant heat dispersion. A cold Flaming Feather seals pliofilm only 20 seconds after plug-in, cellophane 45 seconds after plug-in. This construction also prevents element burn-out. The rapid recovery makes it possible to use this iron continuously, instead of having a spare to use for sealing while the first iron is regaining heat.

ACCURATE PASSAGEWAYS inside of light alloy castings are provided without resorting to metallic tubular inserts or machining, by means of a new McCannacore Process developed by Hills-McCanna Co. While this method of coring is now limited to round holes up to ⅛" diameter, irregularly cored holes are said to be entirely practical. Process is intended to save costly tubular inserts or machining, and also to open up new design possibilities where internal passages are needed in a light casting.

SPECTROGRAPHIC STANDARD samples of high-speed tool steels are now available from the National Bureau of Standards. Six different tool steel standards, carefully analyzed and certified as to composition, have been added to the list of over 500 standard samples which the bureau distributes for use in controlling process and maintaining accuracy of equipment. The tool steel standards, available for a fee of $8.00 each, are designed for calibrating and checking spectrographic methods of analysis. The new standards are complex alloys of iron, chromium, vanadium, molybdenum, tungsten and cobalt, with small amounts of other elements.



WORLD'S LARGEST electric steel forging furnace is now being installed at Wyman-Gordon Co. of Grafton, Mass. for the Air Force Heavy Press Program. The unit, built by C. I. Hayes, Inc., has a heating chamber that will accommodate 10,000 lbs. of steel billets up to 16 feet in length at one time, bringing them up to temperature of 2400 F. It uses 45 Globar elements, 16 Brown electronic temperature controls, eight control panels with 90 selective switches.

1000 POUNDS OF TITANIUM per day is the designed-capacity of a new demonstration pilot plant for the production of titanium metal to be built by National Research Corp. The firm has received a contract for more than a million dollars from GSA to finance construction of the non-Kroll process plant in Newton, Mass.

MORE ANGLES than a libel suit is the way Carboloy Dept. of G-E describes this chrome carbide part produced by powder metallurgy. The part, used in test equipment for high temperature materials, illustrates the great shrinkage between the green compact (left) and the sintered part (right), which must be taken into account in designing tools.

TO DESIGN a new 19-inch Craftsman rotary lawn mower, engineers of the Newark Stove Div. of Sears Roebuck focused their attention on the housing. Die cast in one piece in aluminum alloy B85-52T (ASTM), the housing measures 24" x 20.5" and has thin walls for lightness, reinforced with heavier sections at points of stress concentration. Brand name and operating instructions have been engraved in the die and appear as raised letters on the housing. Finishing consists only of a single coat of paint.

USEFUL BATTERY now being made for civilian purposes is a nickel-cadmium unit developed in the laboratories of Sonotone Corp. of Elmsford, N.Y. Made in sizes small enough to be held in the palm of the hand, or large enough to start a diesel engine, the battery depends upon porous nickel plates made by sintering unusually small particles of carbonyl nickel powder on nickel screen, giving an 80% porous plate with large active surface area in a small volume. Its advantages include: 1) ability to deliver heavy currents at low temperatures, 2) unaffected by extremes of high or low temperature, 3) great durability, 4) low self-discharge rate, 5) ability to accept charge rapidly.

SMALL GAS TURBINE ENGINES have an unlimited future, according to officials of The Garrett Corporation's AiResearch Divisions which recently delivered their 1500th of these power units, now used as starters for large turbojet propulsion engines, and as generators for pneumatic power for cabin heating, electrical energy for communications, and other jobs on aircraft.

SPRAYED CERAMIC COATINGS called the Rokide series, may permit steel, magnesium and aluminum to replace scarce metals in some applications where high temperature service is needed. Norton Company, who developed these materials for use at temperatures from 3000 to 3600 F, has just licensed The Bettinger Corp. for application of these coatings. Widest application is expected to be on rockets, missiles and ram jet parts.

SCHOLARSHIP WINNER is Donald C. Larson of Seattle, Wash., who has been awarded a $500 scholarship by the Metal Powder Association. He is a senior at the University of Washington, studying metallurgical engineering. In his sophomore year, he was also a recipient of an American Society for Metals scholarship.

DON'T CUT PARTS ...Cut Costs!

Why pour money into expensive machining operations?

POWDERED METAL PARTS can do the job for *much less!*

Tough, intricate parts ready for assembly without further processing—at *savings of up to 600% over identical machined parts!* No wonder industry chooses Powdermet.*

Low-cost PM parts are die-pressed to close tolerances, have excellent wearability, and a wide range of alloys are available—many exceeding the tensile strengths of mild steel. Through controlled porosity and electrical permeability, many special properties are achieved . . . such as oil-impregnation for life-time self-lubrication. That's why Powdermet* parts are often the *best parts possible* for gears, bearings, filters, etc.

At Yale & Towne, years of experience and technological know-how in powder metallurgy back up every recommendation on PM parts for *your* particular application.

Get your copy of this informative new booklet now!

*Registered Trade-Mark

YALE & TOWNE

THE YALE & TOWNE MANUFACTURING CO
Powdered Metal Products Division
9335 BELMONT AVE. • FRANKLIN PARK, ILL.

—Send Today For Free Booklet—

The Yale & Towne Manufacturing Company
Powdered Metal Products Division
9335 West Belmont Avenue
Franklin Park, Illinois

☐ Send Booklet ☐ Send information on PM parts for attached specifications or drawings.
☐ Have a Yale & Towne Powdered Metal engineer call on me.

Name..... Title.....
Company.....
Address.....
City..... Zone..... State.....

For more information circle No. 51 on the Reader Service Card

WHY ZINC RATES FIRST IN DIE CASTING • NUMBER 4 OF A SERIES

The faithful reproduction of parent models, by means of zinc die castings, is typified by this miniature Denver-Chicago truck and trailer—one of a complete line of Ulrich HO scale model kits sold in hobby shops throughout the country.

clean-cut detail as featured by ULRICH

The ability to produce ZINC die castings with exacting, clean-cut detail is best illustrated by a few of the many castings employed in the scale model field. These Fruehauf trailer-truck components not only endow the Ulrich model kits with an appearance and "feel" of realism, but with extremely accurate HO scale dimensions (5/32"–1 ft.). And the ZINC die castings produced in long production runs are as alike as peas in a pod—without the need for elaborate machining.

Other ZINC die casting advantages utilized in scale model production (and in many other fields) are: *toughness*—to withstand rough usage; *smooth as-cast surfaces*—to take, and hold, any type of commercial finish; *integrally cast elements*—to provide economical and trouble-free means of assembly; *complexity of shape*—to make one part serve in place of several.

For other examples of product engineering with ZINC die castings in other fields, watch for our ads in this magazine in the months ahead. Send for our new brochure and contact any commercial die casting company regarding your particular production problems.

Send for your copy

The New Jersey Zinc Company, 160 Front Street, New York 38, N. Y.

ZINC
FOR DIE CASTING ALLOYS

The Research was done, the Alloys were developed, and most Die Castings are based on

HORSE HEAD SPECIAL (99.99 + % Uniform Quality) ZINC

For more information circle No. 38 on the Reader Service Card

A special report on PROGRESS AT H-P-M

To Our Customers and Friends

1. H-P-M is now pledged to a series of broad, new policy decisions designed to strengthen our sales, service and manufacturing program. The growing demand for hydraulic equipment increases our responsibilities to the industry.
2. H-P-M will carry out this program as an independent company.
3. Significant developments are in the making for the months ahead. They will be announced within the next few months.
4. Key executives have been selected to play important roles in this new program. Their combined experience with H-P-M in the hydraulic field will accelerate the fulfillment of our plans and strengthen our position.

WILLIAM H. BENNETT
Vice President in Charge of Sales
A well-known H-P-M personality and graduate of University of Cincinnati, has served H-P-M as engineer, Sales Engineer, Director of Engineering, Sales Manager and now Vice President in Charge of Sales. Extensive experience in all phases of hydraulic design and application. Professional Engineer.

GLEN R. PITTMAN
Sales Manager, Hydraulic Power Division
Has successfully served in engineering capacities with H-P-M since 1938. Left the company briefly for another position and returns to head up Power Division sales of hydraulic pumps, cylinders, valves and power systems.

J. W. ARNOLD
Vice President in Charge of Manufacturing
A graduate of General Motors Institute with successful manufacturing and engineering experience in companies such as Cadillac, Ford, Clark Equipment Co., United Stove, and Erie Engine and Manufacturing Co. He brings to H-P-M a wealth of manufacturing managerial talent.

WILLIAM N. WOODWARD
Secretary-Treasurer
A graduate of Ohio State, has served the company since 1946 in the accounting department, as controller and assistant secretary. His promotion to Secretary-Treasurer is an important step in H-P-M's new program.

ROBERT J. LINDSEY
Director of Engineering
Another experienced H-P-M engineer promoted up through the ranks from engineer to Director of Engineering. Served as Chief Engineer of Elmes Engineering Division, American Steel Foundries. He returns to H-P-M now as Director of Engineering.

THE HYDRAULIC PRESS MANUFACTURING CO.
1094 Marion Rd.
Mount Gilead, Ohio
U. S. A.

HPM

For more information circle No. 24 on the Reader Service Card

A valve disc sleeve used in the air release mechanism of a Neptune Red Seal petroleum meter was originally made of brass rod stock, then of die-cast zinc (which proved unsatisfactory) and now of powdered brass. Tolerances are ±.001" on two diameters. The part costs no more than the unsatisfactory die casting and approximately ½ that of the machined part.

This oil pump rotor is used in several IBM machines. Saving in cost as compared with machined parts, says IBM, is 84%! Total tolerances of .001" and .002" are required. Powder metal processing eliminates all machining operations, which previously required 20 hours per 100 pieces.

Making this intermediate wringer-drive gear of iron and copper powder saves its user, the Whirlpool Corporation, St. Joseph, Michigan, up to $20,000 per year. The part was formerly made from a ⅜" blank which was pierced, flattened, machined for teeth; wire brushed for burr. Tolerances on the powder metal part are identical with those obtained by machining.

Powder Metal Processing

Saves $20,000 a Year on this Part

Parts which are difficult to machine... parts which are wasteful of solid metal... are made in powder metal at great savings.

Fully automatic compacting of a broad selection of metal powders, pure or mixed, gives wide flexibility in determining tolerances, tensile strength, and functional characteristics, many of them unattainable in solid metal.

Stokes has over thirty years' experience in making presses *specifically* for powder metal processing. Stokes engineers are recognized for their broad contributions to the growing success of powder metal processing... will gladly contribute their experience to manufacturers interested in powder metal processing as a means of cutting costs and improving products.

Three booklets available: "Powder Metallurgy Today"; catalog of Powder Metal Presses (#801); and "How to Save Money on Punches and Dies". Send for any or all.

F. J. STOKES MACHINE COMPANY
PHILADELPHIA 20, PA.

The Stokes 300-ton Model 713 hydraulic powder metal press, a recent addition to the complete line of 16 Stokes fully automatic powder metal presses of 1½ to 500 tons capacity. Powder metal presses of the modern Stokes' line embody THIRTY YEARS of powder metal press research and engineering.

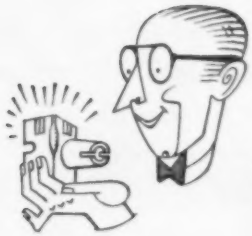
The parts illustrated on this page are made by the Presmet Corporation, Worcester, Mass., custom maker of high-precision powder metal parts... like most producers of powder metal parts, a user of Stokes powder metal presses.

STOKES

ENGINEERS:

Stokes is continually adding to its engineering and technical sales staffs in the high vacuum, industrial tabletting, powder metal and plastics molding fields. If you can qualify, there may be a position for you.

For more information circle No. 46 on the Reader Service Card



WHAT'S NEW IN FINISHES FOR DIE CASTING?

Designers and buyers are asking...

ARE WE GOING TO HAVE TROUBLE WITH ALUMINUM SUPPLIES FOR NEXT YEAR'S DIE CASTING?

They'll find the answers in the September issue of PMM. It's the annual Die Castings Forecast Issue. Every issue of PMM keeps readers up-to-date on die castings: ways to apply, design and finish them. But once a year, in September, PMM's editors devote the entire book to giving men concerned with die castings a guide to current and future plans.

WHAT ARE OUR DIE CASTING SUPPLIERS DOING TO GIVE US BETTER CASTINGS?

Here's a partial outline of the annual Die Casting Forecast Issue's content:

METALS: present and future market picture on aluminum, zinc, magnesium and copper-base die casting alloys.

EQUIPMENT: a designer's-eye view of melting and casting equipment plus developments in die-steels and other materials on which the future of die casting depends.

APPLICATIONS: a study and forecast of trends in die castings uses during the coming year.

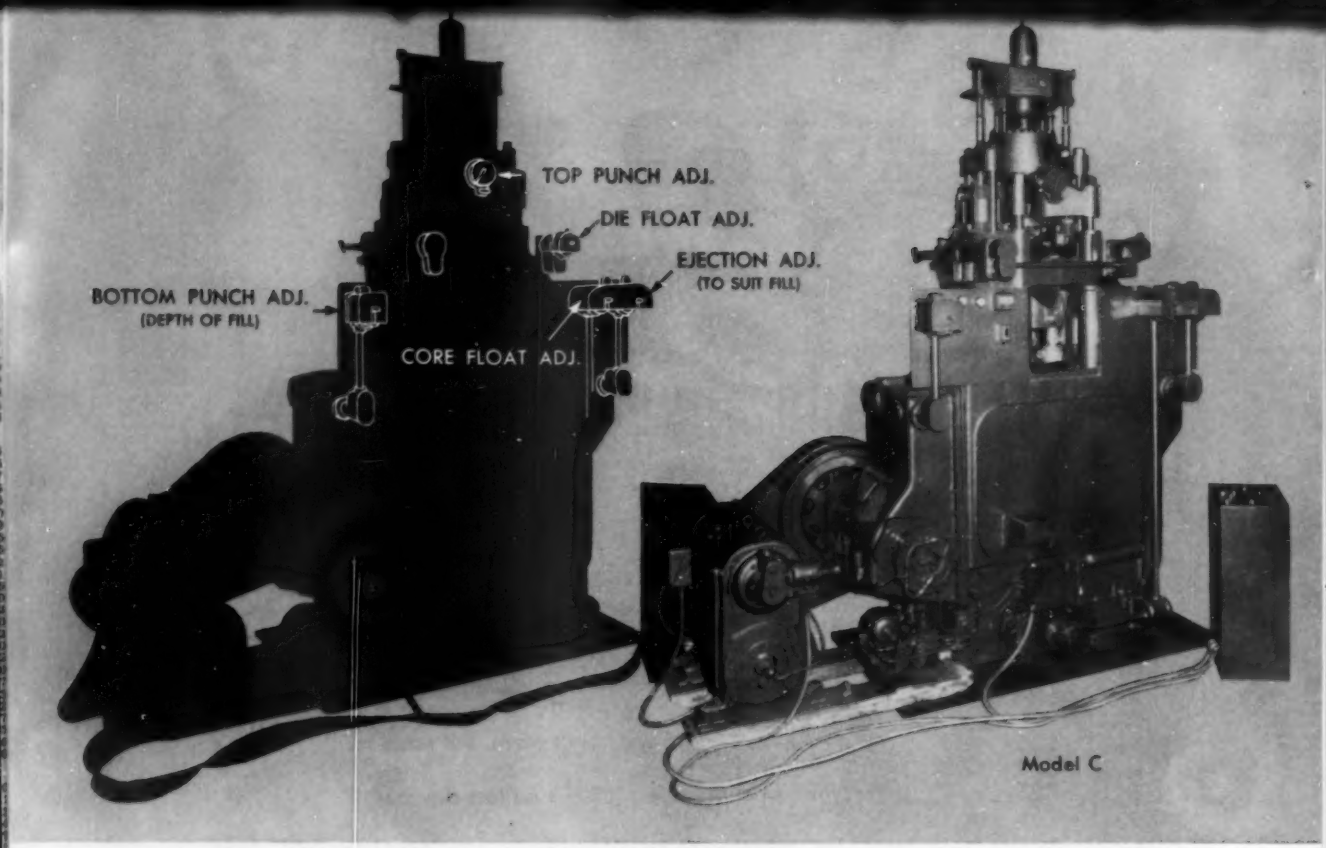
DESIGN: a folio of significant new die castings.

If your company's products and services have a stake in the future of die castings, they ought to be represented in PMM's September issue.

TIME IS SHORT!

Write, wire or phone PMM today at

1240 ONTARIO STREET
CLEVELAND 13, OHIO
SUperior 1-9622



INDIVIDUALIZED COMPONENTS of new Baldwin powdered metal presses make adjustments easy

It's mighty easy to make adjustments in density or weight in Baldwin's new Model "L" and "C" presses. That's just one of the results of a new concept of compacting powdered metals.

These revolutionary new Baldwin presses are not just remodeled heavy-duty pill presses. They have been designed expressly to meet your end product's needs. For example, instead of having combinations of actions, press components have been individualized. That enables you to make adjustments easily to fit any job.

Since there are no cams to change, many of the adjustments can be made while the presses are in operation. Also all controls are concentrated on one panel for easy supervision and adjustment. Two separate controls adjust the depth of fill and the stroke of the bottom punch. The relative position of the core rod to the die is also adjustable to aid in controlling the fill when making counterbored parts.

Further evidence of Baldwin's new concept includes such unique powder metal press features as . . . hydraulic heads, shuttle type feeders, independently floating die and core rod, automatic lubrication and variable cycling. It's no wonder that initial tests prove that these new Baldwin presses can out-produce competitive models by 200%, turn out compacts to closer tolerances and eliminate costly grinding operations.

You'll find more information and specifications on these new presses in our Bulletins 3101 (C) and 3104 (L). Write Dept. 4856, Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pennsylvania.

BALDWIN BLH LIMA-HAMILTON

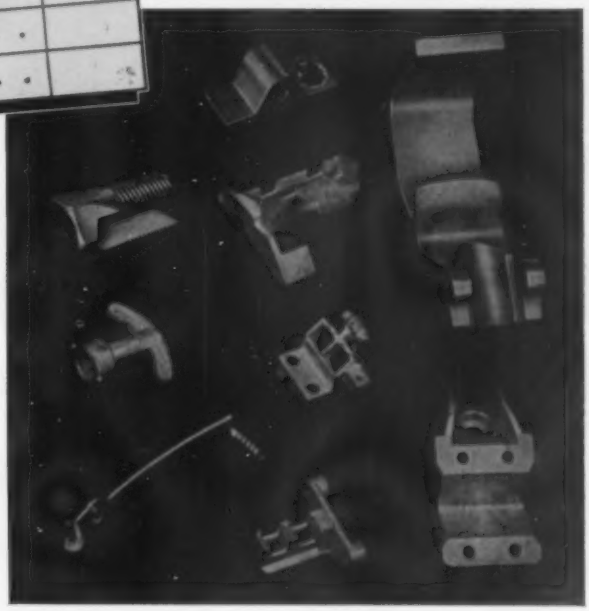
Eddystone Division

BALDWIN-LIMA-HAMILTON

For more information circle No. 10 on the Reader Service Card

DOES YOUR COMPONENT PART REQUIRE:	
1. COST REDUCTION	
2. HI-STRENGTH	
3. CORROSION RESISTANCE	
4. MANY MACHINING OPERATIONS	
5. THAT IT BE MADE FROM BRASS, BRONZE, OR ALUMINUM	
6. IMPROVED APPEARANCE FOR SALES APPEAL	
7. INTERLOCKING PARTS	
8. HIGH-STRENGTH BEARING QUALITIES	

If you can check one item on this list, send us your blueprints for estimating . . .



We'll prove to you

ALCALOY

can save you money on

COMPONENT PARTS

We have a new permanent mold casting process and an exclusive bronze alloy that team up to give you a big cost reduction advantage in your products. Keep these facts in mind when you're designing and planning production.

Alcaloy castings are uniformly close-grained, clean, sound and free from cavities and surface flaws. All dimensional tolerances are held within specifications. This means low machining costs, less scrap, less shop equipment. First costs of castings often are lower than other types.

Our special bronze alloy is non-sparking, non-magnetic, corrosion-resistant and light gold bronze in color. It remains free from tarnish and pitting. Some grades have the strength of steel and hardness of C 35-40. This alloy is valuable in safety tools, machine parts, chains, fittings, utensils and many other products.

We are increasing our facilities to insure prompt delivery on component parts. Send us blueprints or return the coupon below for the complete, money-saving Alcaloy story.

ALCALOY, INC.
P. O. BOX 503 TRENTON, NEW JERSEY
ASSOCIATED WITH DICKEY INDUSTRIES

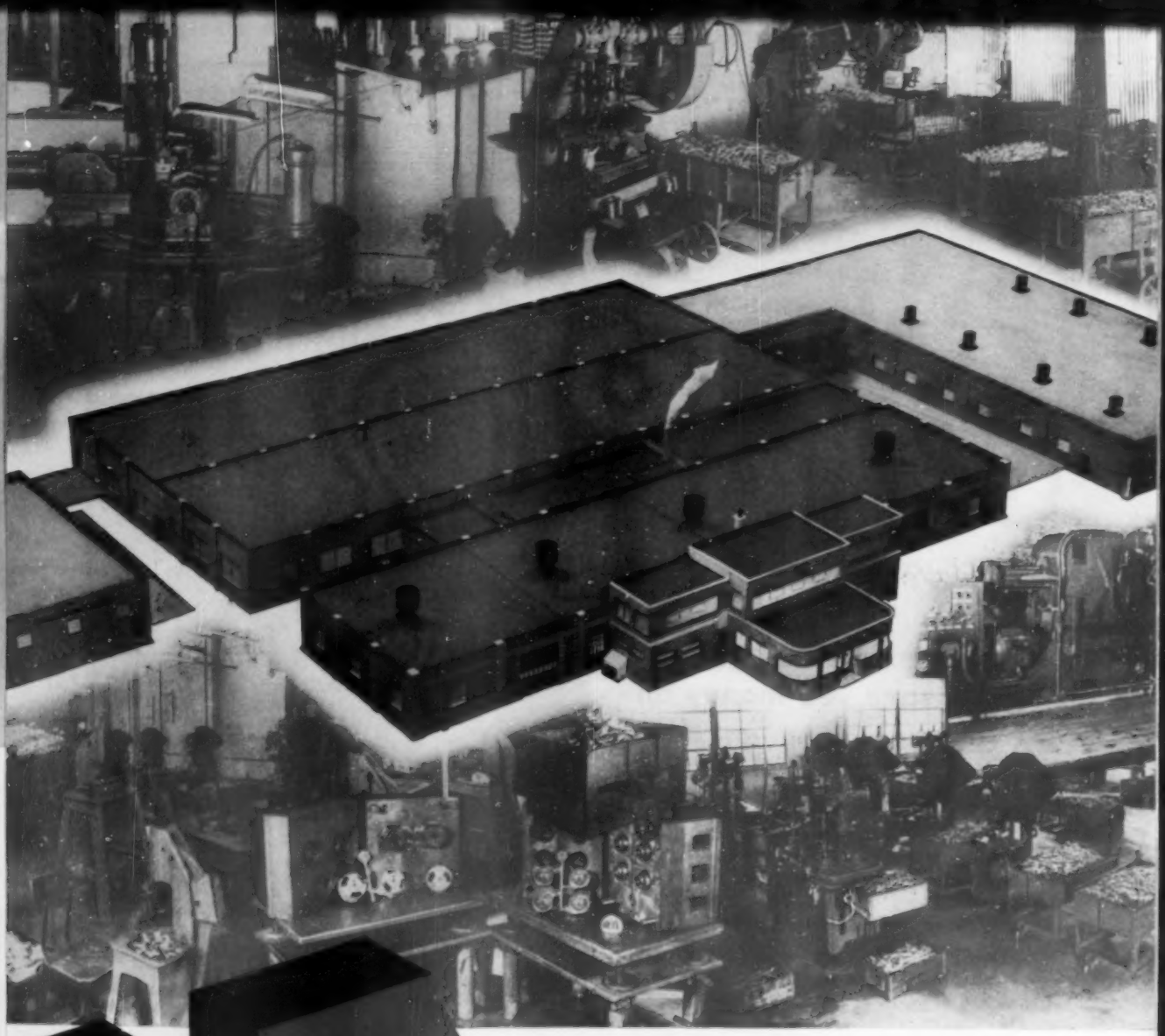
*** ACCURATE INSPECTION INSURES UNIFORM QUALITY**

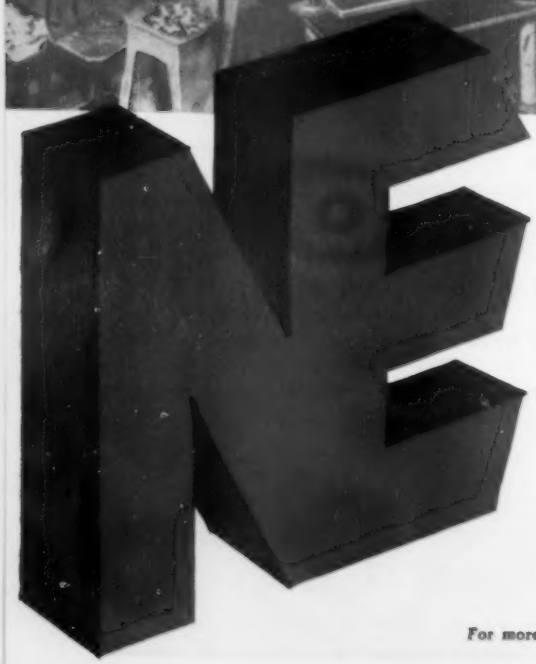
Every phase of Alcaloy production is supervised by experienced metallurgists. We are licensed by U. S. Atomic Energy Commission to use Cobalt 60 in testing castings for internal flaws. You can depend on Alcaloy quality.

Send information on Alcaloy Casting Process ☐
Send new Alcaloy catalog ☐

Name _____ Title _____
Firm _____
Address _____
City _____ Zone ____ State _____

For more information circle No. 87 on the Reader Service Card





60,000 square feet of complete, modern die casting facilities

For more information circle No. 37 on the Reader Service Card

NEW ENGLAND DIE CASTING CO., 445 FRONT AVE. WEST HAVEN, CONN.

COVER STORY

IF YOU NEED DEPENDABILITY at low cost, look at these six die castings which comprise important parts of Ansul's new 10-pound dry chemical fire extinguisher. Castings are: 1) fill cap, 2) carrying handle, 3) nozzle body, 4) nozzle handle, 5) puncture lever, 6) bracket handle.

Products That May Not Fail — 1. Fire Extinguishers

"Attractiveness, as well as function, is enhanced by using die castings for this fire equipment . . ." Harley Hastert, development director (left) and Eric Bonow, design engineer, Ansul Chemical Co.

WHEN the cry, "Fire!" goes out, the equipment to extinguish the blaze must be nearby . . . and ready to work. There's never a second chance if it doesn't.

It's not hard to see why manufacturers of fire fighting equipment have to be conservative in their choice of materials. They must rely upon components that resist breakage, corrosion and leakage.

Yet, in these days of competitive selling, even so strictly a functional product as a fire extinguisher has to be styled for most attractive appearance.

That's why the newest extinguisher in the line of dry chemical fire equipment manufactured by Ansul Chemical Company of Marinette, Wis., features six die cast aluminum parts in its nozzle, handles and other elements. Dependability and styling have been gained at low cost.

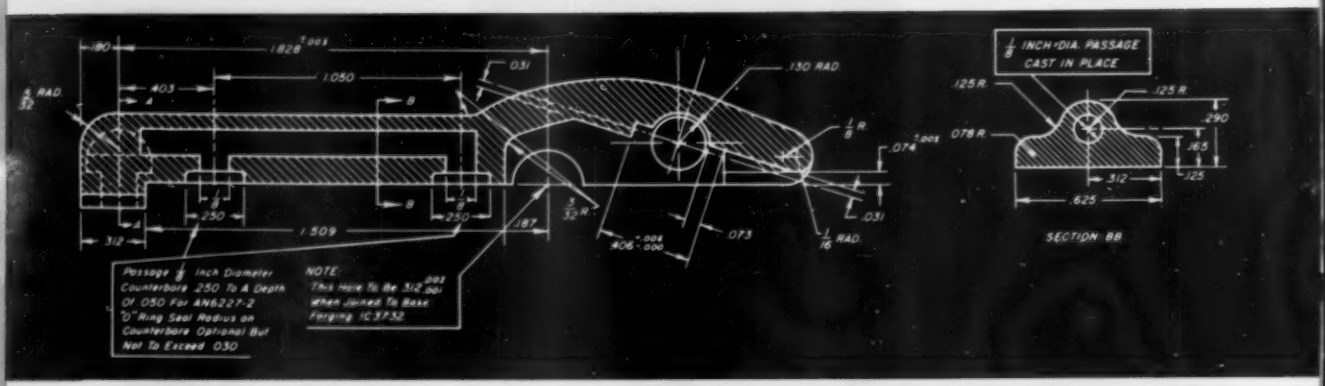
Ansul, pioneer in the field of dry chemical extinguishers, makes a complete range of sizes and types . . . from a 2-pound hand-operated unit, to fire trucks carrying 4,000 pounds of dry chemical. They supply this equipment for installations of many types, principal of which are heavy industry, petroleum, transportation and medium-to-light manufacturing plants.

The new Ansul unit is a 10-pound extinguisher styled by Raymond Loewy. The half dozen die castings in No. 360 aluminum alloy are all exterior parts. The photos, above, show the extinguisher and the six die castings.

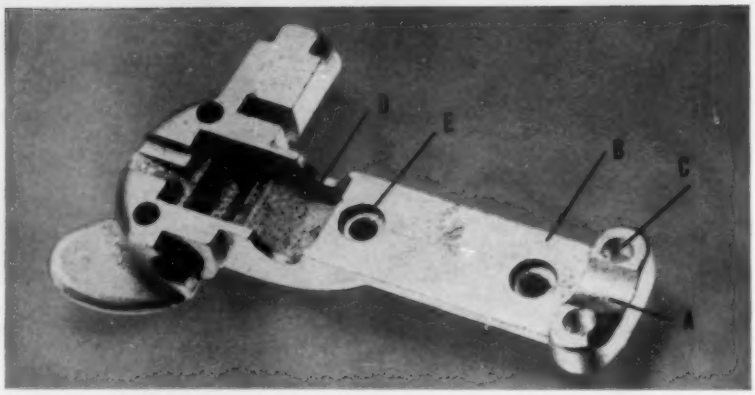
Four critical requirements are met by these castings which are produced for Ansul by Madison-Kipp Corp. and Advance Tool & Die Casting Co.

1. The fill cap and nozzle body withstand internal gas pressure of 225 psi.

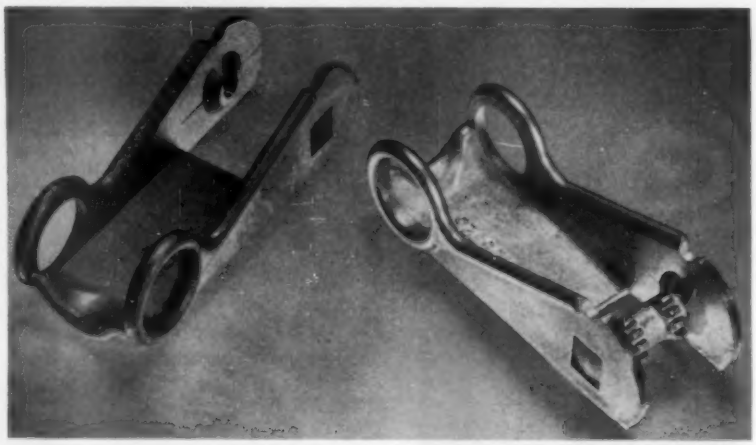
Continued on page 69



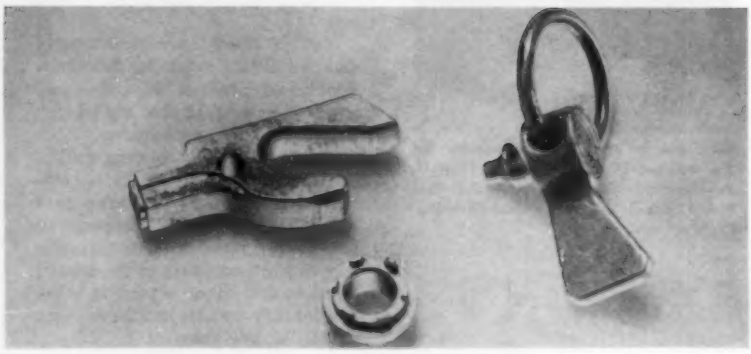
1. **INTERNAL PASSAGE** with both ends opening onto the same surface can be seen in this drawing. It is cored to size and shape by the investment caster.



2. **CLOSE DIMENSIONAL** relationship must be held between surfaces A and B (.313 ± .001); and between cored holes C and arc D (1.828 ± .003). The opening into the cored, U-shaped internal passageway is indicated at E. This beryllium copper casting is the "heart" of the safety device.



3. **SHARP DETAIL** and close tolerances are reasons for producing this investment cast lever in beryllium copper. The square hole is cast to ± .001—.005.



4. **STAINLESS STEEL** (410 alloy) has been chosen for these three castings that have special conditions of service. They are, left to right, the latch, piston, and pin key.

BY W. J. CARBERRY,
Factory Manager
Stanley Aviation Corp.,
Buffalo, N.Y.

5. GAS-OPERATED lap belt that takes over after the pilot ejects himself from the jet airplane, is credited by the U. S. Air Force with saving a number of lives in airplane accidents. The five major components are investment cast.

Products That May Not Fail — 2. Aircraft Safety Device

YOU are flying along in a jet airplane when suddenly an emergency develops. You must bail out. You work the manual control to jetison the canopy and moments later, still strapped to your seat, you are ejected from the plane. You need only be released from your pilot seat and open the parachute, and you're on your way to safety. But . . .

Suppose that the canopy does not release and you are ejected *through* it, perhaps being knocked unconscious; or you suffer broken arms during the emergency and cannot work the manual controls; or the suddenness of the emergency leaves no time to think of and perform several manual operations, even if you are not in a state of panic. Then . . .

That's when you are glad to have an automatic safety device that handles the sequence of operations for you. You depend upon it for your life. In fact, the Air Force credits such a device with having saved a number of lives in airplane accidents.

The device is the MA-1 automatic lap belt, designed and manufactured by Stanley Aviation Corporation in response to the Air Force's urgent request to industry to develop some type of automatic pilot release unit, to replace the manual ones previously used. Too often, pilots had been found on the ground after ejection from the plane, still tightly held in the pilot's seat.

Now, using the automatic lap belt, here is the sequence of events in ejection. The pilot still must control the canopy release and firing the seat catapult, but the lap belt takes over after this.

1. The pre-ejection lever operates to jetison the canopy, lock the pilot's shoulder harness, switch the oxygen supply from the ship's supply to a bail-out bottle, positions the arm rests and leg guards, and prepares the man for separation from the plane.

2. The operator presses the seat trigger which fires the catapult to separate the seat from the airplane.

3. Two seconds after leaving the airplane, the gas-operated lap belt opens automatically, separating the man from the seat and arming the F1A parachute release mechanism.

4. The parachute release mechanism automatically opens the parachute with aneroid and time delay depending upon altitude and speed. Above 15,000 feet the parachute does not open, and/or below 15,000 feet, several seconds are allowed for deceleration to a safe speed and then the chute opens. This time delay and altitude are pre-set according to operational requirements.

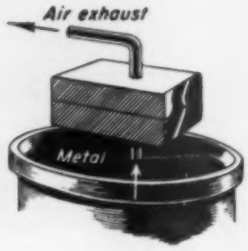
Choice of materials

In designing and manufacturing this unit, the primary factor has been dependability . . . in mechanical operation, in construction and in choice of materials. A device intended as an

Continued on page 42

This process gives accurate castings in some

Bronze Die



THE PRINCIPLE

One distinctive feature of this process is the use of vacuum for drawing the molten metal into the casting die. The principle parallels that of conventional die casting, except that atmospheric pressure is used to force the metal into the dies. The pressure differential for this action is produced by evacuating a chamber in which the casting die is enclosed.

A brief description of a casting cycle best illustrates this process: A steel die is totally enclosed in an air-tight housing. This housing or "receiver" has two openings; one is the sprue opening and the other is the vacuum outlet. In casting, the sprue is submerged in a pot of molten metal and a vacuum applied to the vacuum outlet.

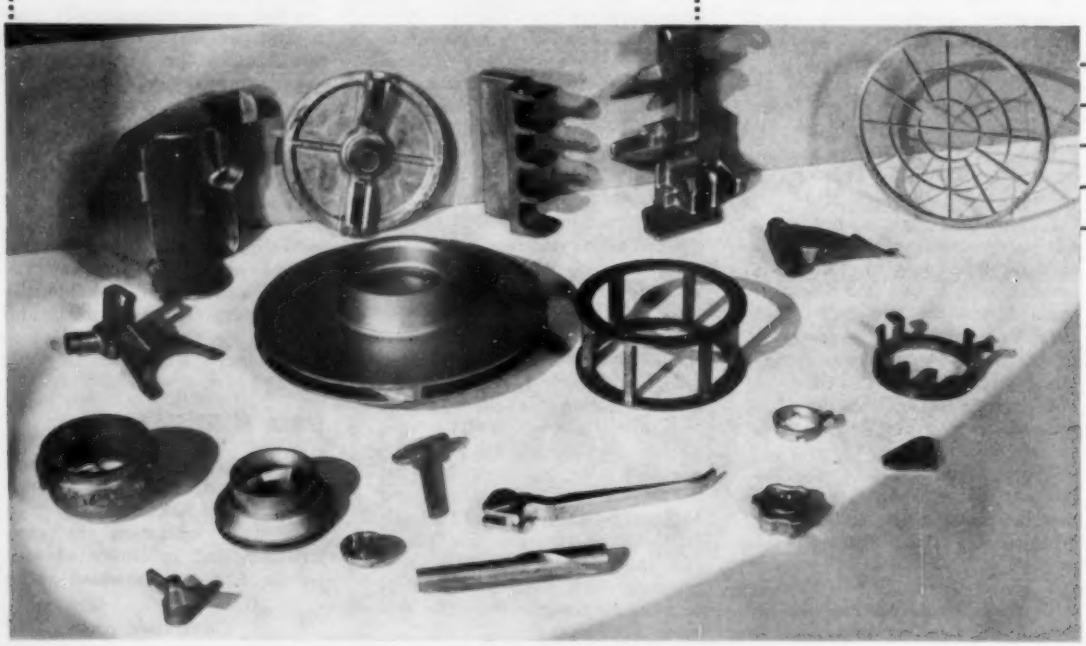
The resultant pressure differential created causes the molten metal to flow up the sprue and into the die cavity. Each cycle produces from one to twenty-four castings, depending on the number of cavities in the die. The time for each cycle, of course, varies with the size and complexity of the parts being cast.

VACUUM Die Casting, a moderately recent development, is being used for a wide range of tough parts productions problems. For years it was recognized that the aluminum bronze alloys offered many desirable characteristics, but involved two specific disadvantages: 1) excessive tool wear in machining due to dross, sand and oxide inclusions, and 2) commonplace occurrence of voids and shrinks.

Vacuum die casting, as described at the left, is reported to eliminate these problems. This process was developed and is being performed in production by the Aurora Metal Company.

ADVANTAGES

Being cast in metallic dies, vacuum die cast parts have all



1. RANGE OF SIZE and shapes that are practical by this process can be judged by this display of production castings.

· tough alloys . . .

Castings By Vacuum

those advantages normally associated with parts produced as die castings and permanent moldings. The most common advantages, of course, include close tolerances, a smooth surface finish and constant uniformity from part to part.

Metallic dies have the added advantage of producing a chill on the castings, refining the grain structure and increasing the wearability and physical properties. Vacuum die casting also offers several unique features.

1. *Controlled metal flow.* By controlling the vacuum, the pressure differential between the die cavity and the molten metal can be varied. This results in very close control of the rate of fill of the die cavity and makes possible the production of castings regardless of their configuration. It also directly influences the soundness of the casting. Voids are practically eliminated.

2. *Elimination of porosity.* Because the air is withdrawn from the die cavity and cannot enter the gate due to its immersion in the molten metal, castings produced by this method are virtually without voids and blow holes.

3. *Elimination of oxide inclusions.* When casting aluminum bronze alloys, a serious oxidation problem is encountered. The vacuum process practically eliminates the formation of oxides because it minimizes the amount of oxygen that contacts the molten metal. The oxides that are formed are deposited on the surface of the casting because of the rolling action of the controlled metal flow. Oxides in this position do not adversely affect the life of cutting tools.

While aluminum bronze has a melting point of approximately 1900 F., casting temperatures range from 2050 to 2300 F. in the process used by this concern. The actual casting temperatures depend principally upon the design of the part being cast, thin sections with a small sprue hole requiring higher temperatures than thicker castings with larger sprues.

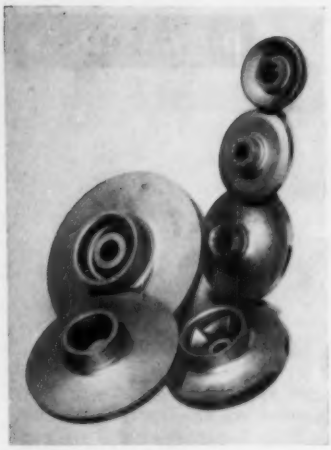
Due to the fact that relatively high temperatures are necessary

Continued next page

Properties and uses of bronze alloy vacuum die castings . . .

ALLOY*	11	11B	15	56	57	145
Tensile Strength, Psi	73,000 — 85,000	80,000 — 90,000	80,000 — 100,000	90,000 — 100,000	105,000—120,000	70,000 — 92,000
Yield Strength, Psi	26,000 — 38,000	35,000 — 45,000	40,000 — 60,000	50,000 — 60,000	80,000 — 85,000	40,000 — 60,000
Elongation, %	40 — 25	25 — 20	12 — 3	10 — 5	5 — 0	20 — 15
Hardness, Rockwell "B"	66 — 74	75 — 81	88 — 95	89 — 93	100 — 110	75 — 85
Remarks:	This is the basic aluminum bronze alloy, known as 89-10-1, copper, aluminum, iron. Test bar physicals are on the order of low carbon steel, but its extensive use is predicated on its excellent corrosion and wear resistance as well. Ease of casting make it most desirable for complicated shapes and unusual contours. Applications of this alloy are wide-spread and all involve moderately heavy duty service.	In this alloy the aluminum content has been increased slightly to give a higher yield strength and some increase in hardness with a corresponding decrease in elongation. This alloy maintains the same good surface and golden color of No. 11 alloy. Modulus of elasticity remains at 16,000,000.	This bronze is a high iron-aluminum bronze, developed specifically for parts requiring unusually high strength and wear resistance.	Additions of nickel and iron to the aluminum bronze give still higher values for yield and ultimate tensile strength with a corresponding increase in hardness. Vacuum cast in metal dies, this alloy shows all the improvement in micro - structure commonly associated with heat treated parts produced by other methods. The exceptional work hardening characteristics of this alloy promote long wear and high fatigue values. This alloy is generally reserved for the most difficult applications.	This is a high nickel-aluminum bronze that was developed primarily for its abrasion resistance. Producing parts of extreme hardness for non-ferrous alloys, Rockwell 28-32 C Scale, the alloy still retains reasonable machining characteristics. Good wearing surfaces and corrosion resistance are inherent characteristics as in all the aluminum bronzes.	This is a silicon bronze of modified composition. The excellent fluidity of this alloy, the ease of welding, and the general good surfaces of the castings, make the alloy well suited for water pump impellers. For heavier sections, aluminum bronze is preferred.

* These are Aur-O-Met alloys cast by Aurora Metals Company.



2. PUMP EFFICIENCY requires smooth waterway surfaces in these impellers, vacuum die cast using a specially-developed type of sand core for smooth surfaces.

3. STRENGTH and resistance to wear and corrosion are important features of these castings for a bottled beverage handling machine. They are cast in alloy 11B.

4. DIFFICULT SHAPE of this mixed flow fan used to cool generators includes vanes that are 0.91 thick and ¾" high. Fan has 7" OD. In operation, it spins at 8,000 rpm, but has been tested up to 17,000 rpm without deterioration.

for proper metal flow of these alloys, special heat resistant alloy steel casting dies are used in this process. Use of this material results in increased die life as these high alloy steels are found to withstand the high temperatures and washing action of the molten metal for a much longer period of time than lower grade die steels.

ALLOYS

At the present time, the vacuum die casting process is used exclusively for the casting of the aluminum and silicon bronzes. The process was originally developed for these alloys, and subsequently proved the most applicable to them. In addition to their excellent physical properties, these alloys are highly resistant to wear, shock, and corrosion, are non-sparking, and have good strength retention properties at elevated temperatures. A list of these alloys appears on page 35, along with their physical properties and a brief description of the uses and characteristics of each.

DESIGN FREEDOM

Of great importance to the designer is the flexibility of this process in producing both simple and complex parts. Figure 1 shows a few variations in shape possible. The size of castings produced range from a fraction of an ounce to more than 100 pounds.

Tolerances that can be maintained involve several considerations. Dimensions entirely within one section of the die are relatively easy to maintain in production; those falling across a parting line present more of a problem. Although rules on tolerances are not hard and fast, in general, a tolerance of ± ½ per cent of the lineal dimension can be maintained. It is less costly, of course, to maintain a tolerance of ±.010 than ±.005, and such factors should be considered when specifying tolerances.

Sharp corners may or may not be a problem, depending on how the die can be parted. Straight holes of ⅜ inch diameter and less usually may be drilled more economically than cast.

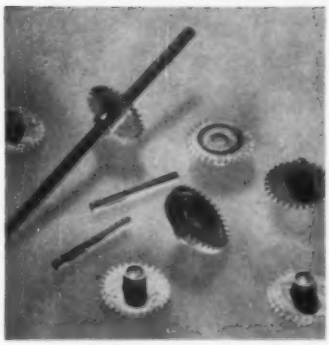
In many cases it is possible to combine a sprue removal and flash trimming operation with a machining operation, giving the customer a machined dimension at no additional expense. If desired, inserts of other material may be cast securely in various sections of the part.

When the internal configuration of a part does not permit the drawing of steel cores, special sand cores are used in vacuum die casting. By means of a special sand core process, developed by this company, cores are held to extremely close tolerances and have fine, dense surfaces.

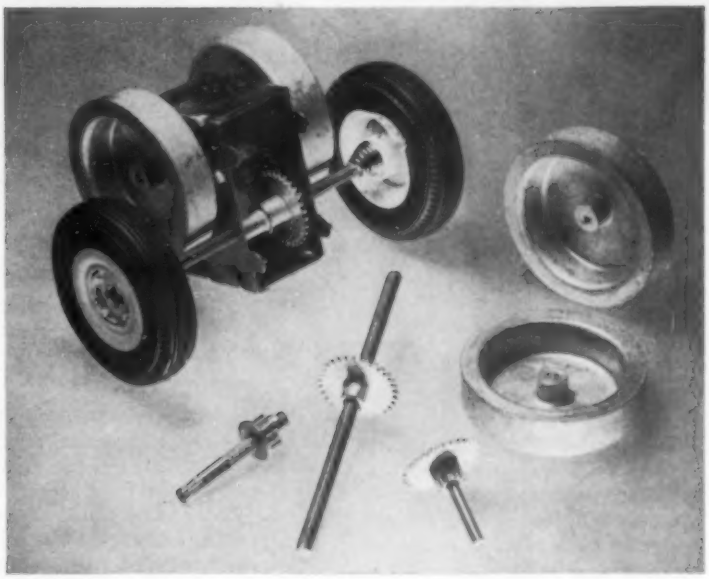
The high quality of these cores is evidenced by the resultant ex-

Continued on page 75

5. BUILT OF VACUUM DIE CASTINGS is this steel strapping tool whose three major components are displayed in the foreground. All are cast with such smooth, clean surfaces that neither milling nor sanding is needed for a good fit of parts. The high strength alloy used to make these die castings gives adequate strength for the very highly stressed parts.



1. PLATED TRIM and load carrying parts (arrows) are die cast in zinc. (Top left).



2. GEARING of many types is more economical die cast in zinc than by other methods.

3. MASS NEEDED in the flywheels of this impulse motor, right, is obtained by die casting.

Plated Trim
Stressed Parts
Wear Parts
Heavy Parts

Toy Parts That Must Be Die Cast

TODAY, some parts of scale models are molded in plastic of one type or another. However, a number of parts must still be made of metal and for these parts, the die casting process is pre-eminent.

The application of zinc die castings to scale model automobiles and tractors made by Product Miniatures of Milwaukee, Wis., clearly shows that metal parts, particularly zinc die castings, have an irreplaceable position in this industry.

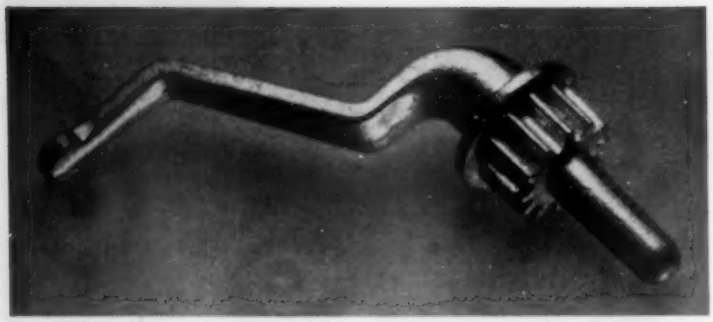
An examination of the groups listed above with reference to the accompanying illustrations will make clear why zinc die castings are the preferred materials in each case.

A. Plated Trim

On two scale model automobiles shown in Figure 1, the bumpers, head and tail lights and grilles must simulate their chromium plated counter-parts. No plastic material currently available has the required appearance and the cost of separate plastic parts, finished to resemble chromium by some process such as vacuum metallizing, is higher than a die casting which has been bright zinc plated. Further, a die casting can be made so that the problem of fastening it to the plastic body is much simpler than fastening a plastic part.

In almost every case, therefore, parts of this general type are die castings with a bright zinc plated finish.

Continued next page



4. WHEN IT COMES TO COST, die cast zinc can beat any other manufacturing method for complex, small shapes like this one, which was formerly put together as an assembly of stamped and screw machine parts

B. Stressed Parts

The model of the tractor in Figure 1 shows parts that are subjected to stresses higher than plastics will stand. The bolster design is such that considerable bending and shear stresses are set up when even light loads are applied, such as the weight of a hand on the hood to propel the model. If this part were molded of plastic failure in shear would almost invariably occur at the points indicated by the arrows.

The same type and amount of loading would also impose rather considerable bending stresses which would contribute to ultimate failure.

Because of the inability of plastic materials to take the necessary stresses, this bolster and parts similar to it on other models is always metal and generally a zinc die casting, as it is in this case. The problem of fastening the wheels onto the axles is another reason this part is of metal, as is pointed out below.

C. Wear And Assembly

Many models are built with impulse motors so that, after the motor has been set in operation, the vehicle will be self-propelled for a short distance. In these impulse motors, a relatively high gear ratio between the wheels of the model and the flywheel must be established. Obviously, the gearing in these motors is subjected to very considerable wear. To secure the motor life that is required, metal gears must be used and zinc die castings are, by far, the most economical parts for these units. Several of these gears are shown in Figures 2 and 3. These same illustrations show another reason for the use of zinc die castings for the gears.

It would be possible to make the shafts on which the gears are mounted and then die cast the part with the shaft as a cast-in insert, but this would materially increase the most of manufacture. Instead, the shafts are cut to length, knurled where the gear is to be mounted, and then be pressed into the cored hole. The knurling adequately locks the two parts together. If the gears were made of plastic, for example, such an assembly would not be possible and the shaft would have to be molded in the gear.

This same ease of assembly is another reason for making the tractor bolster of metal. Even if a plastic bolster would take the loads that are likely to be applied, two inserts of metal would have to be molded-in for axles — increasing the cost of the unit considerably above that of a die cast bolster.

D. Mass

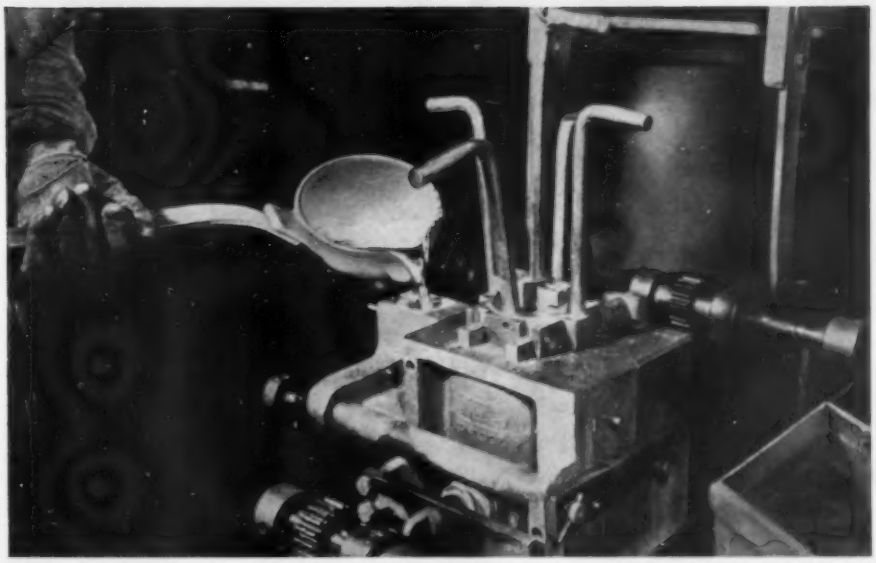
The impulse motor shown in Figure 3 has two flywheels which, when rotated rapidly, provide sufficient inertia to propel the vehicle for a short distance. In this application, it is essential to have as concentrated a mass as possible. Obviously, a plastic material cannot be used. While some other metals would give a slightly greater mass for the same volume, the cost of making these parts to the required accuracy would be far greater than die casting. Both concentricity and uniform distribution of mass are essential, both secured in a die casting.

A sand casting, for example, would require overall machining and balancing while machined bar stock would be costly because of scrap losses.

A further deterrent to the use of anything other than a die cast flywheel is the mounting operation. As in the case of the gears, a simple knurl holds the wheels in place on the shaft when pressed on. Almost any other metal that might be used for the flywheels would require a more expensive fastening method.

Some other parts on the models illustrated are also die cast. The lifting mechanism for the tractor contains some parts that are subject to both wear and stress. These parts are, therefore, zinc die castings. The gearing shown in Figure 2 is for a somewhat different type of impulse motor than the one shown in Figure 3. In this motor, the flywheel is mounted horizontally and hence the cup gears shown must be used to transfer the power through a right angle. The cluster gears and the spur gear with the molded spacer ring are further examples of the advantages of the die casting process for these parts.

For more information circle No. 2 on the Reader Service Card ⟶



Use improved mold coatings to get better aluminum castings

Problems which arise in casting aluminum in permanent molds—over-rapid chilling, rough surfaces, sticking to the molds—are solved by the use of 'dag' dispersions.

'dag' dispersion No. 193 (vermiculite in water) is now widely used in the permanent-mold industry to provide a smooth, tenacious, insulating mold coating which allows the melt to remain fluid longer and flow better. Proper application of this valuable 'dag' dispersion produces a smooth, durable coating which gives first-class castings every time.

An overspray of 'dag' Colloidal Graphite on top of an insulating coating helps in ejecting the casting and prolongs the life of the vermiculite wash. Cores are usually coated with 'dag' Colloidal Graphite, and it can be used alone on molds when casting sections are relatively thick.

To get more information regarding 'dag' dispersions for insulating and lubricating coatings, write us and ask for Bulletin No. 425-S10.

Dispersions of molybdenum disulfide are available in various carriers. We are also equipped to do custom dispersing of solids in a wide variety of carriers.

ACHESON COLLOIDS COMPANY
PORT HURON, MICHIGAN
...also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

use 'dag' dry films for trouble-free lubrication

"Hmm—maybe if we modify our tools a bit, we'll reduce our aluminum machining problems"

Good idea, I'll finish my sandwich. Then send for a copy of George Sall's 4-page booklet "Machining Aluminum".

This booklet is written in shop terminology offering economical solutions to everyday machining problems.

Copies of "Machining Aluminum" are available without obligation . . . write to our Metallurgical Department.

This is only one of the research and service facilities offered to industry by our company. In addition to controlling our quality with the most modern techniques known, our Metallurgical staff is always at your service. They will be glad to consult with you on any problems related to non-ferrous metals. We can also develop and produce special alloys for any special requirements you may have.

For superior service in non-ferrous metals, call . . . .

"Better Alloys for Better Castings Through Creative Metallurgy"

The George Sall Metals Co., Inc.

2304 EAST BUTLER STREET—PHILADELPHIA 37, PA.

PRODUCERS OF: Aluminum, Brass and Bronze and Zinc Alloy Ingot; Hardeners, Z-shot and bar for Zamak production; Salloy; Special Alloys

For more information circle No. 44 on the Reader Service Card

H. E. HALL DIES; HEADED METALS DISINTEGRATING

Harold Everett Hall of Short Hills, N.J., age 45, died July 8 at his summer home in New Hampshire. He had been president of Metals Disintegrating Co., a subsidiary of American-Marietta Co.

H. E. Hall

Mr. Hall was the son of Prof. Everett Joel Hall, a pioneer in the field of powder metallurgy. He was educated in the public schools of Passaic and Elizabeth, N.J., and attended Columbia University, leaving to begin employment with the company his father had founded in 1916. He served as president and director of the firm from 1943 until his death.

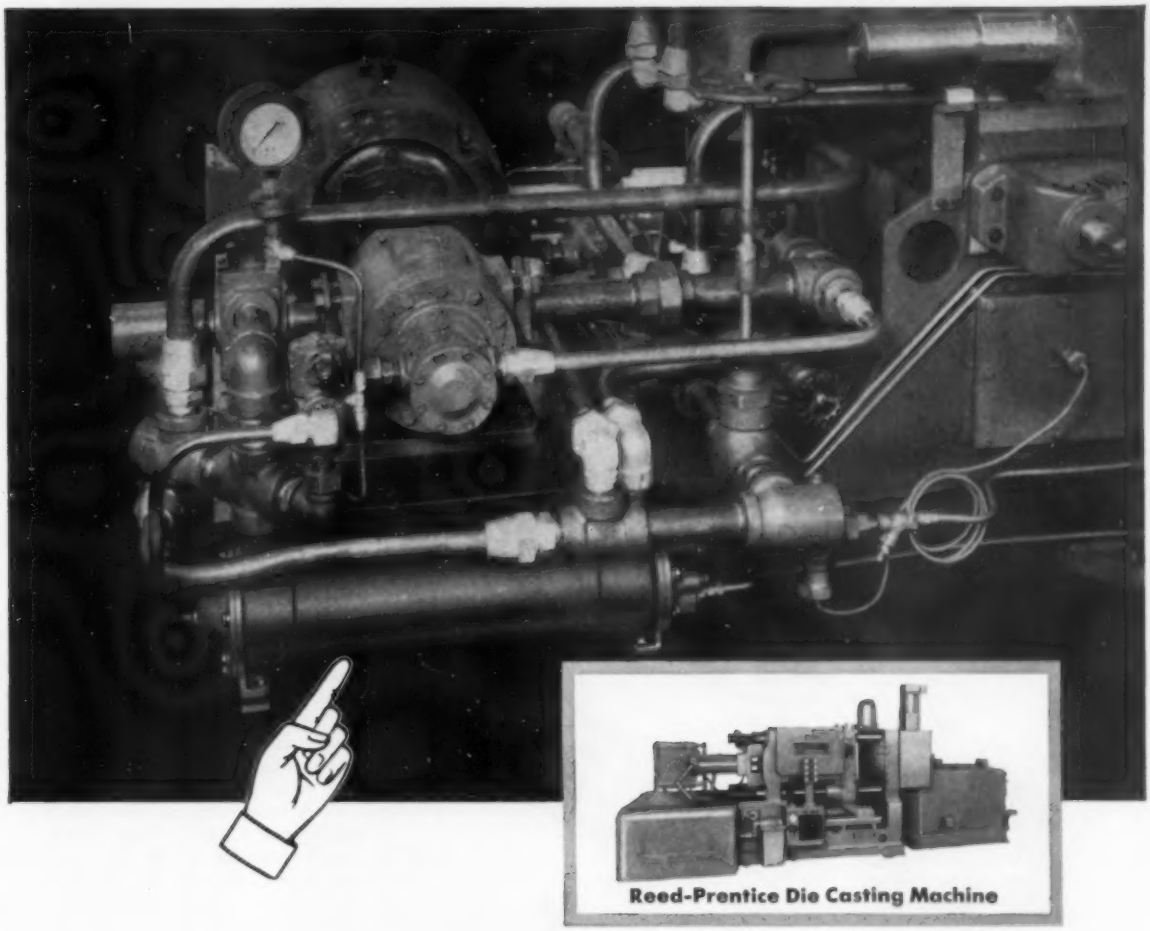
Mr. Hall followed his father's leadership in building the company which is a foremost manufacturer of finely divided metals and one of the major producers in the field of powder metallurgy.

He was instrumental in founding the Metal Powder Association, of which he was first president, holding that office for four years and was a member of its board of directors at the time of his death. He was also a director of Northeast Engineering Company of Manchester, N.H.

ICI AFFILIATES WITH CASTINGS COUNCIL SET FALL MEETING

The Investment Casting Institute has voted to accept an invitation to affiliate with the National Castings Council, according to an announcement made today by Ted Operhall, ICI president. The Council is a medium for cooperative action among the various associations, societies and institutes serving the foundry industry on matters of mutual interest which are beyond the scope of the individual societies.

The Institute also announced that it would hold its annual Fall meeting in Detroit, November 1 through 3, 1955. Tentative arrangements have been made with the Sheraton-Cadillac Hotel for the three-day technical-business sessions.



Reed-Prentice Die Casting Machine

ROSS EXCHANGER COOLS OIL

to assure peak locking pressure

Neatly mounted close to the heart of the hydraulic system, in this Reed-Prentice No. 2 Die Casting Machine, is a compact Ross Type BCF Exchanger. It insures full die locking pressure of 400 tons by maintaining correct oil temperature at all times. *Pump slippage from overheated, thinned oil is effectively prevented!*

Like Reed-Prentice Corporation, other manufacturers of numerous types of hydraulic equipment regularly furnish Ross Exchangers to assure safe, dependable oil cooling.

Some of their reasons for doing so:

- Ross Exchangers, in addition to being top-rated for thermal efficiency, are ruggedly built to withstand punishing hydraulic shock.
- They're readily obtainable from stock in a wide range of pre-engineered, fully standardized sizes to meet most needs.
- Convenient, accessible connections facilitate installation.

For detailed information, request Bulletin 1.1K5.

KEWANEE-ROSS CORPORATION
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
1446 WEST AVENUE • BUFFALO 13, N. Y.
In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

ROSS
EXCHANGERS

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

For more information circle No. 27 on the Reader Service Card

LIFESAVER
continued from page 33

emergency lifesaver *cannot fail.*

Stanley engineers studied possible manufacturing methods carefully before deciding how the MA-1 lap belt should be fabricated. Some components have shapes that are difficult to produce economically; some must meet rigid physical demands.

Five major components of the device are investment cast by Hitchiner Mfg. Co., Inc., two in beryllium copper and three in 410 stainless steel.

Beryllium copper was picked for the cover casting and lever casting because of its clean reproduction of surface detail and its excellent castability.

For special conditions of service, such as a 300 pound line pull on the hole in the pin key, Stanley designers have specified the stainless alloy. The latch and piston are also cast in this alloy.

A U-shaped internal channel, with both ends opening onto the same surface, was one of the production problems in the cover casting. The drawing, Figure 1, shows how this hole, ⅛" in diameter and more than an inch long, is located inside the casting. This channel is used for the flow of gas during the critical operation of the belt. The gas, moving through this channel, pushes back a piston and releases the belt for emergency operation.

The investment caster supplies this hole with all details satisfactory. It presents a difficult casting problem, since the investment material must be firm enough to withstand the influx of molten metal, yet must be cleaned out of the hole after casting. Dimensions of the hole are not critical, but the hole must be clean and smooth.

However, some dimensions are extremely close and most are cast to decimal tolerances. For example, the relationship between two surfaces indicated by "A" and "B" in Figure 2, the cover casting, is held to .313 ±.001 and the end slot is cast to a total tolerance of ±.002.

Only machining on this casting establishes the very close dimensional relationship between two rear holes "C" and the half hole "D" which calls for ±.003 over a length of 1.828.

Likewise, the lever casting, Figure 3, is closely dimensioned. An example of this is the square hole cast to a limit of +.001–.0005, while a cast round hole is held to .003 TIR, on center.

The three stainless steel castings, Figure 4, are the pin key, a latch and a piston. The shape of these is such that investment casting is most economical.

The piston, for example, was previously made on screw machine, but machining of the small lugs was a problem, since one of them must be higher than the rest. Shape and detail of the latch would be difficult to machine, but is relatively easy to cast. On these dimensions, too, the investment caster is held to close limits: thickness of the latch is cast to ±.002 and then ground to ±.0005.

All-in-all, the use of investment cast parts has helped to expedite and simplify the production of an essential aircraft device. Cost of this safety equipment is lower than would be practical by normal machine shop manufacturing methods.

More Efficient Production, Better Product Performance And Lower Costs . . .

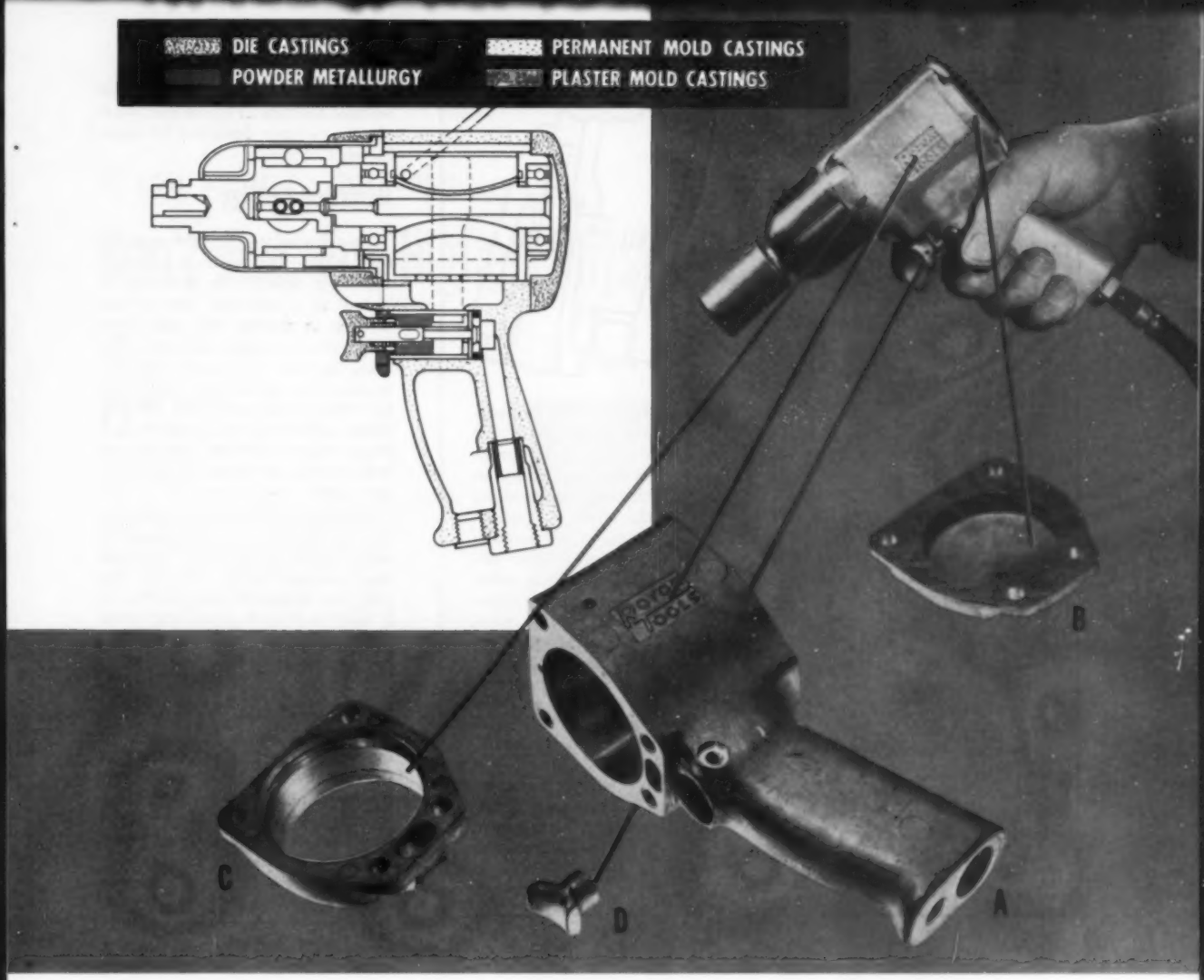
are reasons why SCOTT-ATWATER uses ACCURATE die castings

■ Because of their uniformity and light weight, ACCURATE die castings greatly reduced the time required for handling and assembly. Cast to close tolerances, they reduced or eliminated machining operations, special tooling and scrap loss. In addition, a more dependable and efficient motor was produced with die castings that have high strength-light weight properties and are non-porous and leakproof. Perhaps you too, can improve your product and profit picture with ACCURATE die castings. Write, wire or phone if you have a parts problem demanding immediate attention.

ALUMINUM • ZINC • MAGNESIUM DIE CASTINGS

ACCURATE DIE CASTING CO.
3089 E. 80th STREET • CLEVELAND 4, OHIO

For more information circle No. 1 on the Reader Service Card



With sound castings plus powdered metal parts, you can

Put Porosity Only Where It's Needed

By P. VAN SITTERT
Chief Development Engineer, Rotor Tool Co.

IN order to produce an impact wrench that would have all of the desirable features of such a tool and still be moderately priced, the design engineers of Rotor Tool Co. have made wide use of the precision metal molding processes. On the one air operated tool, above, four precision molding methods of manufacturing components are used.

There are several characteristics that a tool of this general type must have if it is to be widely accepted. It must:

- Be as light weight as possible since it is hand-held and used in a wide variety of positions, including overhead;
- Be highly reliable since it is used on assembly lines in the mass production industries such as automobile and home appliance manufacture;
- Be amenable to easy and rapid maintenance so that, when service is needed, the tool will not be out of use for long periods;
- Have a built-in, and substantially automatic, lubricating system;

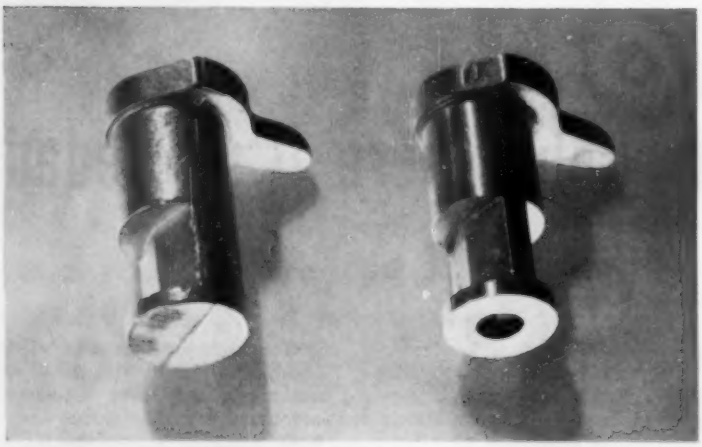
You can use a standard powdered metal bushing as an oil-air metering valve

THE particular handle design shown illustrates the method of automatic lubrication employed. It will be noted that there is an opening between the two chambers. A standard porous bronze bushing made from metal powders is inserted in the air passage and positioned so as to block off the opening between the two chambers.

In operation, when the tool is connected to the air line and the air turned on, the pressure will build up to line pressure at the valve or trigger. When this occurs, air will pass through the porous bushing and build up line pressure in the oil chamber.

Now, when the tool is operated there is an immediate drop in pressure in the air chamber, and air pressure in the oil chamber forces some oil through the bushing and into the air stream which carries the oil to all moving parts of the tool. Upon release of the trigger the valve closes, air pressure again builds up and oil flow stops.

During this period, the pressure in the oil chamber is again built up. Thus, the natural impulse type of operation acts as a pump to move oil from the reservoir into the air stream. Periodically, a fresh supply of oil must be added to the reservoir by removing the plug in the base of the handle and filling the reservoir.



The valve body must be free machining and completely non-porous. To avoid excessive scrap generated by machining bar stock, a plaster mold casting is used. At left is the raw casting, at right is the completely machined component.

• Be strong enough to stand the normal amount of abuse and must also be contour designed for comfortable holding.

Magnesium Castings

To achieve the lightest possible tool, magnesium castings are used wherever possible. In the first illustration a sectional view of the wrench is shown with the three magnesium castings indicated. The body casting is of particular interest. This piece must withstand air pressure up to at least 100 psi., retain oil when it is present as a finely dispersed mist, and be cast with smooth surfaces where cores are used.

To achieve the desired lightness, the casting must be of magnesium with walls as thin as strength requirements will permit. The part was originally designed to be a sand casting, but pits and blow holes generated too large a number of rejects to be economical.

Plaster Cores For Smooth Holes

Semi-permanent mold castings were then tried. With sand cores, the usual method of making these castings, almost all of the troubles inherent in sand castings were evident.

When, however, the sand cores were replaced with plaster cores, a far superior product resulted. Cored surfaces which could not or need not be machined were adequately smooth for the service and because no sand is present there were no pits or inclusions from this source.

The handle section is divided into two chambers. One of these is for air passage to the motor and the other for an oil reservoir. The wall between the two chambers is quite thin and must be perfectly air and oil tight.

Because the allowable clearances on the air tool of this nature are small, castings are made with from 0.005 to 0.010 allowance for machining. Because of the rapid rate of cooling and the ability to have optimum gate and riser design, the castings are uniformly fine grained and of maximum density. When machining is done, a smooth surface held to exact tolerances can be achieved with

Continued on page 48

If you want to cut costs

Don't Ask For Higher Physicals Than You Need

ONE criticism that is sometimes leveled at parts made from metal powders is that they are physically inferior to so-called competitive materials.

Like so many other generalizations, this one, at best, is only a half truth. The actual facts of the case are that *through the use of the powder metallurgical processes, almost any desired combination of properties can be secured.*

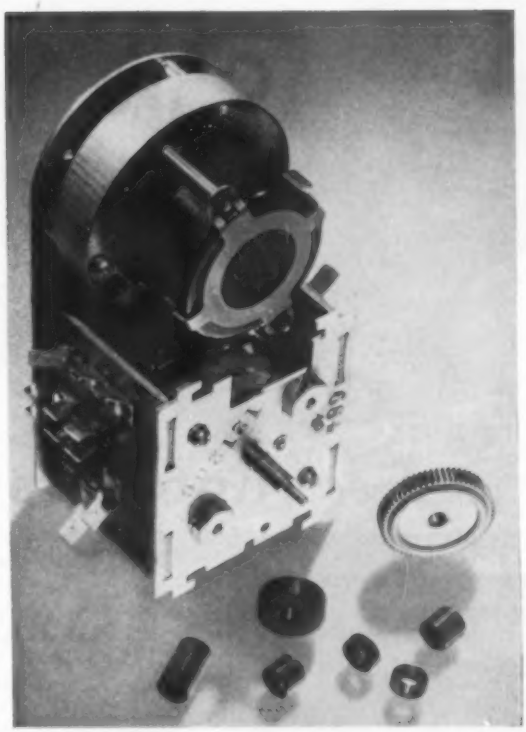
In addition to duplicating the properties of the more traditional materials of construction, there are a host of special properties that can be secured through the use of powdered metal processes and by no other method presently known.

There are two basic reasons why the misconceptions concerning powdered metal parts have arisen:

1. **Over-design** . . . many parts are made from brass or bronze because the materials are readily available, not because the particular physical and mechanical properties inherent in them are required.

2. **Comparison of costs at the wrong level of manufacture** . . . when a conversion from casting or machining to a powdered metal part is made, the only place where a cost comparison can be made is at the point where the finished component is installed in the machine or subassembly for which it is intended.

To illustrate these points, consider the model L timer, above, for an automatic washing machine. This timer, is made by P. R. Mallory & Co., Inc. of Indianapolis, Ind. and can handle up to 14 different circuits without changing its physical dimensions from the standard 2½ inch thickness. This high degree of flexibility is achieved by using relatively thin cams separated by spacers made from iron powder. By changing the number of cams and hence the number and length (or thickness) of the spacers, either more or less circuits can be operated.



BY CHANGING the spacers between the cams, up to 14 separate circuits can be controlled and cycled by this timing device. Powder metallurgy is the economical answer to spacer manufacturing problems.

These powdered iron spacers, made by the Indar Corp., have some relatively close dimensional tolerances such as thickness and bore diameter, but no particular requirements as to strength; *yet these spacers have been made in the past of wrought stock in both iron and brass.* Obviously, the relatively high tensile and compressive strengths of these two materials are completely wasted here and a material that answers the purpose as a spacer is all that is required.

Continued next page

"Precision is almost automatic, once tools are properly made and tested . . ."

For this use, then, powdered iron spacers with a relatively high degree of porosity are used. The dimensional accuracy that is required can easily be secured; there is no scrap loss as there is in machining and with the same set of tools many different thicknesses can be made by simply varying the depth of fill of the dies. Actually, 24 different spacers are in current use where the only variation is in thickness.

As to dimensional accuracy, the bore is held at 0.254 to 0.260, the outside diameter at 0.370 to 0.380 (in some cases a larger OD is required that runs from 0.401 to 0.411). Thickness, or length, tolerances are generally ±0.003 to 0.005. All of these tolerances are relatively easy to hold by the process.

The length, or thickness, varies from 0.156 to 0.760, giving all of the necessary spacers that are needed for varying the number and spacing of the cams which make and break the circuits.

One other dimensional requirement is imposed on these parts. The faces must be flat and parallel within 0.002. Here again, the very nature of the powder metallurgical process makes meeting this requirement almost automatic. If the tools are properly made, this parallelism is assured.

Because a very low cost material is used (at about 70 percent density the cost is only about 7 or 8 cents per pound) and because there is no machining scrap loss, it becomes very apparent why spacers made from iron powder have shown a material saving.

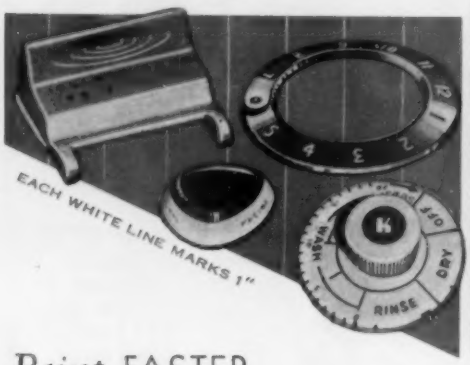
One of the spacers has a ribbed outside. These ribs have no functional application and are put on for identification purposes only. Assembly of the correct spacer is then by sense of feel rather than by sight since almost duplicate lengths are involved in the two different units, thus speeding assembly.

Powdered Iron Gear

Another powdered iron part used in this timer is an idler gear between the drive pinion on the motor and the cut gear that drives the shaft carrying the cams. Both wear and torque requirements on this part are low. Here again, both brass and steel bar stock have been used in the past and the gear machine cut.

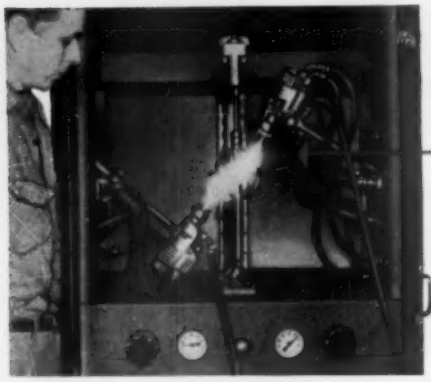
All dimensional requirements of this gear fall well within the limits possible by powder metallurgy and again because of the real physical and mechanical requirements a part with a rather high degree of porosity is permissible. The saving in both material and machining is evident.

The several parts discussed show clearly how over-designing can lead to the use of a far more expensive part than is required under the conditions of operation. The use of the ribbed outside on the one type of spacer further shows how identification is made easier, at no additional cost, thus speeding up assembly so the portion of the overall cost saving comes after the part has been completely made. This latter point emphasizes the need of cost comparisons at the correct level.



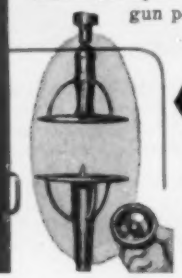
Do you PAINT any parts like these?

Paint FASTER with FIN-E-CO's RotoSprayer



up to 1,200 per hour

OSCILLATING GUN reaches the hard places on parts with angles, corners, and bridges. Makes set-up easy. Stationary gun positions also.



HOLD-DOWN pushes part into mask, or can be used for mask on top side.

EASY FEEDING of parts— always stops at same place, when the spindle stops rotating.

Experienced operators NOT required.

HOW IT WORKS: The operator loads the part, touches the foot valve— and the machine takes over: Automatically the hold-down grips the part, rotation starts, paint guns go on, then off, rotation stops, the hold-down releases.

● A complete painting machine including Booth, Fan, Guns, Pressure Tank. 100% air operated.

How much can YOU save with the Fin-E-Co RotoSprayer? We'll be glad to estimate . . . send us sample part. FINISH ENGINEERING CO., INC., 1115 Cherry St., Erie, Pa., Phone 5-4478.

MANY KINDS of Painting Machines . . . also Automatic Paint Wipers, Mask Clamps, Mask Washers, Stainless Steel Screens and Fixtures (silk screen process)

FINISH ENGINEERING CO., INC.

For more information circle No. 68 on the Reader Service Card

NAMES IN THE NEWS

Dr. Samuel Zerfoss, a physical chemist, has joined the Mineral Products Division of the *National Bureau of Standards* where he will engage in research in chemical reactions at high temperatures.

William V. Burley, Jr., has been appointed comptroller of *Titanium Metals Corp. of America.*

Minnesota Mining & Manufacturing Company has announced the appointment of **C. C. March** as general manager of the coated abrasives and related products division and **R. W. Mueller** as general manager of the fibrous and industrial tape division.

John G. Hall has been appointed plant manager of *National Lead Company's MacIntyre Development.* **Charles R. Begor, Jr.,** and **Archibalt J. McDonell** have been named assistant plant managers.

Harry L. Smith, Jr. has been elected sales vice president of the *Aluminum Company of America.*

The appointment of **Norbert K. Koebel** as manager of its Heat Treating Furnace Division has been announced by *Lindberg Engineering Company.*

Appointments of three men to executive posts in the sales organization of the *Behr-Manning Division of Norton Company* have been announced: **Thomas Trowbridge** was named assistant general sales manager; **William J. Bennett** as sales manager for the company's eastern region and **Victor F. Perreault** as industrial trades manager.

Robert G. Callison has been elected to the post of vice president in charge of regional sales and sales, and **T. Kenneth McGuire** as general sales manager of *Peters-Dalton, Inc.*

Metal & Thermit Corporation has announced two new sales appointments in the Electroplating and Coatings Sales Department which now operates as its *United Chromium Division*: **Henry Mahlstedt** has been named manager of sales and **Donald R. Meserve** as assistant manager of sales.

Appointment of **John F. Whitcomb** as general sales manager of the coated abrasives and related products division and **Richard L. Sheppard** as general sales manager of the cellophane tape division has been announced by *Minnesota Mining & Manufacturing Company.*

Roger H. Watkins has joined the Cleveland sales office of *F. J. Stokes Machine Company* as a senior sales engineer.

F. J. Stokes Machine Company has opened a new sales office in Toronto, Canada. **J. William Robinson** will be in charge of the new office. **Fred Walters** has been added to the Stokes' staff as a sales engineer and will make the Toronto office his headquarters.

YESTERDAY
TOMORROW
The Trend is with Badger . . .
BADGER quality makes your product more competitive!
• Zinc and Aluminum Die Castings •
BADGER
DIE CASTING CORP.
261 WEST OKLAHOMA AVE. MILWAUKEE 7, WISCONSIN
For more information circle No. 9 on the Reader Service Card

Paul Bixler and **James Culton** have joined the headquarters staff of the International Division of *F. J. Stokes Machine Company*. They will assist **Charles V. Nicholson**, manager of the division, in coordinating Stokes' overseas sales efforts.

Reed-Prentice Corp. has announced the opening of two new sales offices. The west coast office will be under **Robert W. Carr** while **C. W. Kendall** will cover the western New York and Pennsylvania.

Wheelco Instruments Div., Barber-Colman Co. has announced that **Robert N. Miller** is now in the Los Angeles office, **Francis H. Beaupre** is now located in Chicago and **Howard P. Berger** is in charge of the Detroit office.

IMPACT TOOL
continued from page 44

no danger of uncovering porosity or voids. The possibility of porosity at the grain boundaries, a characteristic of coarse grained castings, is reduced to a minimum.

Both ends of this main housing must be closed in the one case to form an air seal at the rear of the tool and on the other or front to enable the mounting of the steel clutch hood. The two magnesium castings used for these jobs are die castings. These castings are ready for assembly as they are received from the jobbing die caster with the possible necessity of a light sanding on the surfaces where they mate with the body.

Since the body casting contains the motor, bearings and some other functioning parts, it is probable that from time-to-time, the caps will have to be removed for servicing the tool. Magnesium does not wear well under this service. To prevent the threads in the holes from wearing excessively, threaded inserts are used, in this case Heli-Coil inserts. These steel inserts, once installed, remain permanently in the casting and all of the wear between the threaded portions is taken by steel. A threaded insert is also used in the handle where the nipple for the air line attaches.

Another die cast magnesium part, used on the wrench, is the trigger. This casting requires practically no machining also other than to drill a small cross hole for a pin to hold it onto the valve stem.

The reversing valve was first made by machining from solid bar stock, but by converting to a plaster mold casting, much of the machining has been eliminated and with it, a large scrap loss of brass. The rough casting and the finished valve are both shown. While there is still considerable machine work to be done on this part, the use of a plaster mold casting has materially lessened it.

The smooth exterior surface desired needs nothing more than a smoothly sanded finish. So that the two die cast caps will always match the body, they are cast slightly larger than the body and after assembly are sanded or ground to match the body. No surface coating of any sort is applied and experience has shown that the magnesium castings, under normal service, need no protection.

IN THE WEST IT'S . . .

UNIVERSAL
Die Castings

Preferred when only the best is good enough

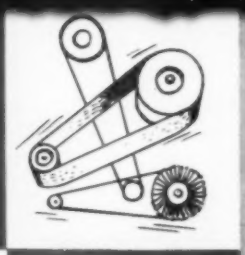
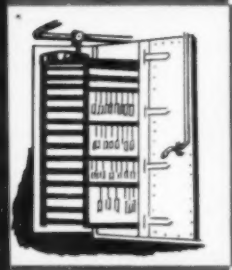
When you buy your die castings from Universal, you are gaining the services of experienced die casting engineers, die designers, production men and management. You are putting a well-equipped shop to work on your castings. You will find, as hundreds of other companies have, that you can depend upon Universal for quality, service, delivery and prices that will help keep your own production costs down.

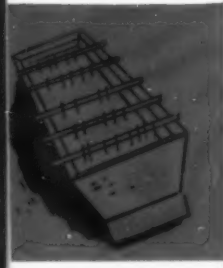
We Specialize In Brass Die Castings.

UNIVERSAL
DIE CASTING COMPANY

5001-05 Santa Fe Ave. • Los Angeles 58, Cal. • Phone Kimball 7264

For more information circle No. 50 on the Reader Service Card



PMM

Finishing Section

Finishing includes all secondary operations performed on precision metal molded parts — up to and including final surface treatment. This section presents new information about the specialized methods, equipment and materials needed for finish-machining, assembly, surface preparation and final finishing of all precision metal molded parts.

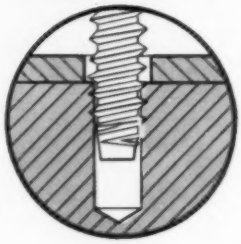
devoted to the specialized problems of finishing . . .

DIE CASTINGS • INVESTMENT CASTINGS • PERMANENT MOLD CASTINGS • PLASTER MOLD CASTINGS • POWDER METAL PARTS • SHELL MOLD CASTINGS

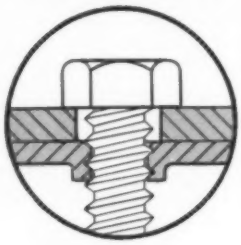
For Self-tapping Screws that...

Start Right

Drive Right



Seat Right



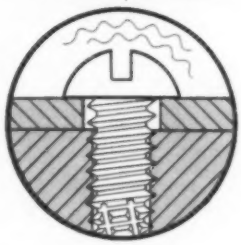
Millions in savings made with P-K Screws since they were originated by Parker-Kalon have proved the Self-tapping Screw *method* reduces assembly costs.

But it takes more than the right method to make sure planned savings pay off. It takes P-K quality standards to guard against defective screws that cause assembly trouble, costly damage to parts, and hidden weakness that shows up in customer complaints.

Only Parker-Kalon can offer P-K quality, the indispensable extra, along with the proved advantages of Self-tapping Screws.

Plan your assemblies for lowest cost . . . a P-K Assembly Engineer will help you. Then make sure *planned* savings *keep on paying off* . . . when you purchase, order "P-K". Parker-Kalon Division, General American Transportation Corporation, 200 Varick Street, New York 14.

Stay Tight



PARKER-KALON®

The First **SELF-TAPPING SCREWS**

originated by P-K . . . and *first* today . . .
the leading choice for fastening economy

Remember **P-K** means **OK**

For more information circle No. 60 on the Reader Service Card

How 40 Holes And 12 Bosses Are Inspected To ±0.001 In 20 Minutes

1. SOME OF THE 20 CHART GAGES used to check dimensions on this magnesium die casting are seen in the background.

CHECKING multiple hole and boss locations can be a time-consuming and expensive job. It is a common production-line headache in inspecting die castings and other types of precision castings.

But quality control engineers at Graflex, Inc., have found a way to inspect complex parts fast, accurately and economically. For example, on one component, a magnesium die casting with 40 holes and 12 bosses, they are checking relative locations within ±.001 in a matter of 20 minutes, compared with an estimated 4¾ hours to do the same job by surface plate inspection.

This casting, Figure 1, must be checked as its use allows no distortion whatever. It is essential that a quantitative as well as qualitative check be made so that corrections can be made in bosses that may be slightly out of tolerance.

Graflex is using optical gaging techniques. Using a contour projector, Figure 2, the part is inspected in 20 positions with a separate chart gage for each position, Figure 1. Only one holding fixture is needed.

In addition to more rapid inspection, this method has other advantages: parts can be checked during production to catch any errors before further work is done; rechecking is simple; closer control of the entire production operation is possible.

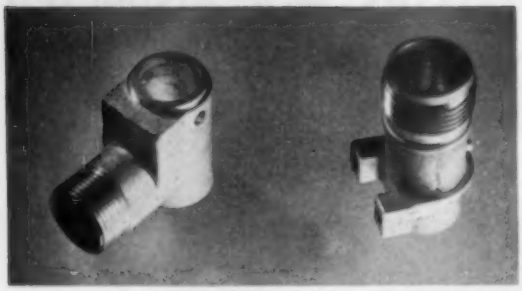
Here's how it works: The shadow image of a hole is centered with the outline on the appropriate chart-gage placed on the screen of the comparator. From this position, the fixture is then moved horizontally until several bosses appear on the screen. This distance is accurately controlled by gage blocks. The bosses are now compared with rulings on the chart-gage, and if bosses fall within tolerance limits on the chart-gage, they are within accurate dimensional relationship with the hole.

If, on the other hand, the boss edges over a tolerance line, the fixture is moved by a horizontal or vertical micrometer on the stage of the comparator until the boss comes within the tolerance lines. This indicates to the nearest tenth how far from tolerance it is.

Both shadow and surface illumination are used in this procedure for sharpest definition of holes and bosses on the screen. The operation outlined above is repeated for each of the chart-gages to check dimensions on different parts of the casting.

2. OPTICAL COMPARATOR permits quantitative, as well as qualitative check.

3. FIXTURE holding the casting is moved on the comparator stage for inspection.



1. THESE TWO brass investment castings will be soldered to a drawn part and then the assembly plated.

2. FULL STRENGTH, commetcial muriatic acid is used as a cleaning dip to remove heavy oxides.

Radar Parts Precious Metal Plated

By **BURT R. SERVASS,** President
Home Plating Co., Inc.

SOME of the radar components that are being manufactured by the South Wind Div. of Stewart Warner Corp. require that two small, brass investment castings be soft soldered to a drawn brass body and the assembly then silver-palladium plated.

Because high frequency currents are carried on the surface of a conductor, rather than by the entire cross-section of the conductor, it is desirable to have a material with resistance as low as possible for current-carrying purposes—hence the silver plated surface.

Under some conditions, however, this silver surface can become tarnished to such an extent that its resistance is materially increased. To protect the surface against corrosion and any other conditions which might reduce conductivity of the surface layer, a protective palladium coating is put over the silver.

Production quantities of this part are not great enough to warrant continuous automatic plating, so the work is done in still tanks with manual transfer from station to station.

The investment castings, fully machined but not fastened to the drawn body are shown in Figure 1. After soft soldering, they go to the Home Plating Co., a job shop plater, where the finishing is done.

As the first step in the finishing procedure, each assembly must have a copper wire fastened to it for support and to act as an electrical conductor. Positioning of the wire is critical since the parts are always supported by it and drainage must be as complete as possible to prevent drag-out from tank to tank.

First, the parts go to a hydrochloric acid dip, Figure 2. Here full strength commercial acid is used with a dip time of from 4 to 5 minutes at room temperature, followed by a cold water rinse.

Next, the pieces go to a soak cleaner. Here Oakite compound No. 27 is used at 170 to 200 F. This is a short duration dip that is followed by another cold water rinse.

The previous steps have removed most of the oxides and all oil, grease and other soil so that the parts are ready for a reverse current clean, using Clark No. 501 cleaner. This step, requires from 2 to 3 minutes at 170 to 200 F and is again followed by a cold water rinse.

To brighten the parts, they are then given a dip in mixed nitric and sulfuric acids in the ratio of 1:2, Figure 3. The dip is for from 3 to 4 seconds and is followed by a very thorough cold rinse. The bright dip bath is operated as nearly as possible to room temperature.

After the acid dip, the surfaces of the parts are practically chemically clean. They are, therefore, transferred as rapidly as possible to a sodium cyanide dip which completely neutralizes any remaining acid and dissolves the light tarnish that has occurred after acid dip.

A silver strike comes next. Here

3. AFTER DEGREASING and other soil removal the final traces of oxide are removed with a nitric-sulfuric acid dip.

4. THE CLEANED parts are then silver plated. This plate is about 0.0005 inches thick.

For Conductivity

the parts are held for about 30 seconds in a silver cyanide-potassium cyanide bath. A very light deposit of silver is plated in this step using a current of from 4 to 5 amperes per part and with stainless steel anodes. Control of the silver strike bath is by analysis and is maintained at a silver concentration of about 0.3 ounces per gallon. This bath also operates at room temperature.

The silver plating comes next, Figure 4. In this bath, a current of 40 amperes is used for a load of 14 pieces. The bath operates at room temperature and utilizes silver balls as anodes. The time in the bath is 1¼ hours. The potassium cyanide content of this bath must be held at about 12 ounces per gallon and the silver content at 6 ounces per gallon. This bath applies a layer of silver from 0.0004 to 0.0006 inches thick.

From the silver plating bath, the radar components are thoroughly rinsed in cold water and are then scratch brushed to give a matte finish, Figure 5.

After another rinse, the pieces are ready for palladium plating, Figure 6. Here two pieces per load are used at a current of from 2 to 2½ amperes in a room temperature bath for from 30 to 45 seconds; palladium anodes are used. The composition of this last

Continued on page 80

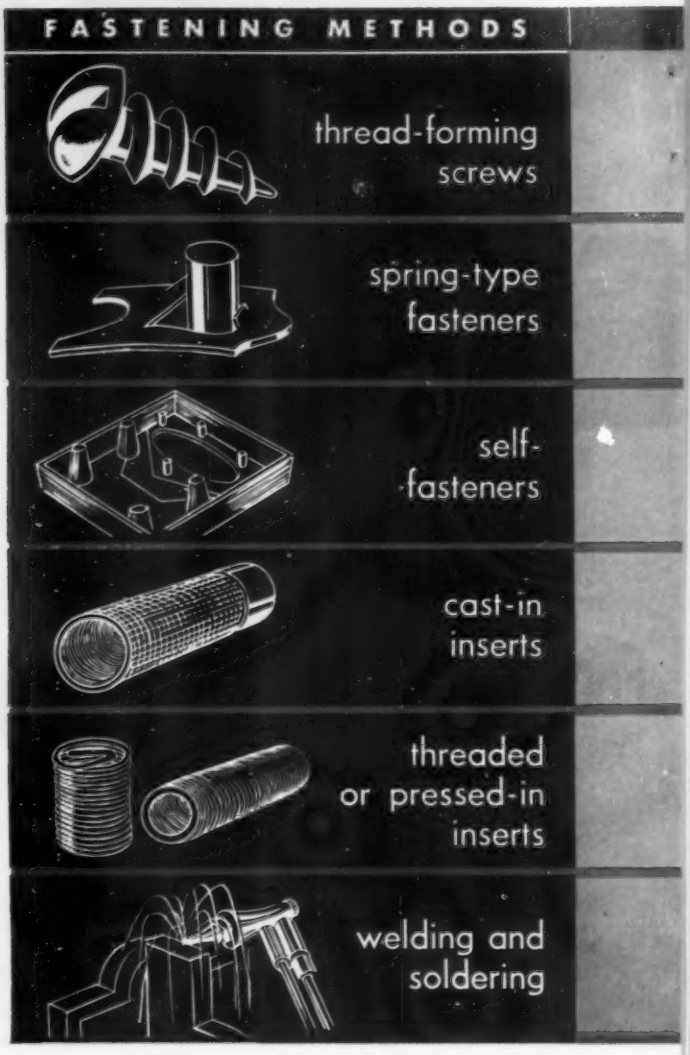
5. TO SECURE the finish desired the silver plated assemblies are scratch brushed.

7. FINAL INSPECTION may include plated thickness checks. This is a spot check since it destroys the plate where the test is made.

6. FOR COMPLETE protection against tarnish and sulfide formation a thin palladium plate 0.00005 inches thick, is applied.

PMM ROUND-UP

6 Ways To Fasten Die Castings



WHEN you pick the methods for assembling your product, certain inherent features of the die cast components can be put to use to simplify fastening and save production time. A number of special fastening devices have been developed to take advantage of these characteristics and can be specified for maximum economy; on the other hand, the properties of the die cast alloy can sometimes be utilized for self-fastening.

One thing is certain: you should plan your fastening method at the time you make the original designs because most of these fastening methods depend upon design details that must be included in the die casting die. To alter a die as an afterthought can be an expensive procedure.

Machine screws in tapped holes are still commonly used, but make no particular use of the unique properties of die castings. The drilling and tapping of holes are probably the most widely performed machining operations on die castings.

Why are die castings easy to assemble?

Here are some characteristics of die castings that will be useful in planning your assemblies:

1. *They are accurate and uniform, will mate properly with each other or with other components.*
2. *Holes for screws can be cored accurately with regard to size, shape and center location.*
3. *Bosses, lugs and other projections to mount, locate or support components can be formed as integral parts of the casting.*
4. *Inserts can be placed in the die casting die so that the molten metal will flow around and lock them permanently into the body of the casting. Location of such inserts to provide holes for inserting screws can be closely controlled.*
5. *Ductility of some alloys favors riveting, spinning or other simple cold forming technique for self-fastening.*

WHERE USED	ADVANTAGES	TOOLS USED	DESIGN FACTORS
Appliances, business machines, automotive accessories, photo equipment, portable tools, etc.; Either permanent or semi-permanent fastening.	Save tapping; give a perfect thread fit; fast to assemble; can be withdrawn and re-inserted.	Standard screw driving tools or machines; can use hopper feed; screws have slotted, hex, Phillips or clutch head.	Holes can be cored accurate enough on diameter and center location; stock allowance is needed for thread engagement. Size and location of hole may make it better to drill than core.
Appliances, auto trim, nameplates, electronic devices, business machines, etc.; Hold studs in through or blind holes.	Fast assembly; vibration resistant; good for mounting trim onto appliances, autos, etc. No turning threads on mounting bosses. When used in holes, can serve keying, splining. Useable in inaccessible locations. Can be disassembled.	Can be pressed on by hand or with simple hand tools.	Bosses can be integral part of die casting within close tolerances; Many types of fasteners are available to fit; Can be used in round or irregular holes.
Fastens two mating die castings, or holds material such as a stamping onto a die casting; Permanent assembly.	Where it is suitable, it saves cost of fasteners and machining operations; Fast and simple to perform.	Ordinary staking, riveting or spinning tools and equipment; Can be done by hand or with pneumatic tools.	Zinc alloy is most suitable for this; Piece to be fastened to die casting must be situated so that die casting can be cold formed to grip it, commonest way is to slip piece over die cast boss and rivet over.
Pneumatic tools; machinery; devices that are frequently disassembled; aircraft; business machines; major appliances; etc. where stresses or wear are low.	Stronger threads resist stripping; Can use metals of many types for special properties; Firmly anchored in casting. Available as proprietary or custom made pieces. User of castings does not have to do any machining.	None. Inserts are placed in die by die caster and are an integral part of casting as received.	Insert must be located so that it can be held in the die; Must be sufficient body of metal around insert to hold it firmly; Location is moderately close; Slows the casting cycle.
Pneumatic tools; machinery; aircraft; business machines; devices that are subjected to stress, wear, vibration or frequent disassembly.	Reinforces tapped threads in nonferrous metals; Adds special properties of insert metal such as bronze, stainless steel, etc. Easy to service or replace in field.	Some cut their own threads in cored holes, others require tapping; Small, hand tools with special tips may be needed. Some inserts are simply pressed into slightly undersize hole using arbor press.	Location, service conditions and section design will influence choice of inserts of this type. Sufficient wall thickness must be provided to support insert properly.
For permanent assemblies, especially those needing hermetic seal; for shapes too complex to cast in single unit; attaches castings to castings or castings to other metal parts; Welding can be used for zinc or aluminum, soldering can be used on aluminum, tin or lead.	Results in an assembly that has the rigidity and pressure-tightness of a one-piece unit.	Blow torch, spot welders or inert arc welders with the appropriate rod are used. For soldering, an ultrasonic unit can be used to join aluminum die castings.	Complex shapes not practical to cast in one piece can be built up. Complex shaped castings with varying wall thickness can be attached to sheet metal. Hermetic sealing can be achieved between welded or soldered components such as pump components, fluid transmissions, etc.

6. *Die cast alloys have favorable physical properties. While they have low enough hardness to permit the use of thread forming screws, they have high enough shear strength to reduce the likelihood of thread stripping.*

7. *Where holes are to be drilled and/or tapped, the accuracy of the die cast components permits the most efficient single or multiple spindle operations with the simplest type of jigs.*

The big volume in which die castings are processed and assembled makes it essential to streamline the fastening methods as far as possible. This can often be accomplished by using specially developed fasteners, or by the simple means of staking, riveting or spinning some portion of a die cast component.

Whether or not a product is likely to require frequent disassembling in service will affect the choice of fasteners, as will special conditions such as undue vibration, alternating hot and cold cycles, problems of surface finish, accessibility of surface on which the fastener is to be located, stress-loading of the assembled joint, etc.

The first thing a designer needs to know in planning an assembly method is what methods are available.

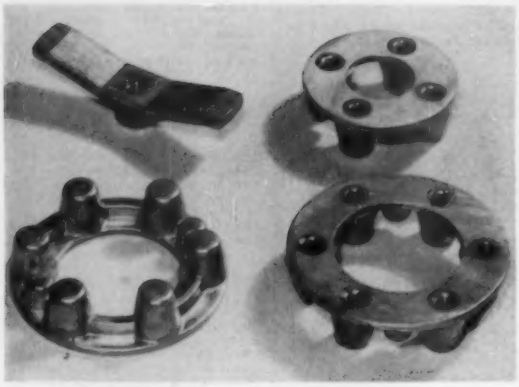
Which fastener for your job?

The methods of fastening, other than the use of conventional machine screws or rivets, include thread-forming screws; spring-type fasteners; cast-in screw thread inserts; pressed-in or turned-in thread inserts; self-fastening by cold-forming methods; welding, soldering and brazing; and adhesives.

There's A Special Fastener To Do Your Job

4 Case Histories

solutions to die casting assembly problems



PROBLEM 1: Thread-stripping in fuel fittings

Excessive scrapping of die cast fuel cell fittings for military aircraft was caused by damage to threaded, cast-in-place inserts during assembly and testing. Production delay and material loss resulted.

SOLUTION: A *two-piece*, molded-in Rosan insert with replaceable inner section was used. This insert 1) has steel threads for wear and strength; 2) has self-locking internal thread with zero leakage factor; 3) withstands heat and pressure of die casting; 4) is easily replaceable if damaged. Fittings such as those illustrated sometimes have as many as 48 inserts.

SIGNIFICANCE: This type of two-piece insert, made by Rosan, Inc. can be used wherever it may be desirable to replace a molded-in insert. They are available in National Fine Series (full-threaded or counterbored, standard and self-locking) and National Coarse Series (full-threaded standard and self-locking), with threads from #6 to ½ inch. Material is C 1117 steel or equivalent, or 303 stainless.

Design factors to consider: 1) self-locking feature should be specified when safety wire or lock washer is undesirable and means must be provided to lock the mating bolt; 2) counterbore should be specified when the length of the insert is equal to or greater than the usable threaded portion of the standard AN bolt to insure proper engagement of the bolt with the locking area of the insert; 3) if surface of the casting is to be machined, the steel insert should be below the finished machined surface, but if the top of both insert and casting must be machined, the 303 stainless insert should be specified; 4) since 1½ threads clearance are provided between the bottom of the internal portion and the cap, the length of the mating bolt should be carefully chosen to make sure it does not contact the bottom of the cap.

Big Volume — Rapid Assembly Are Characteristic Of Die Casting Fastenings

Thread-forming fasteners: Screws that form their own threads in holes[1] save tapping operations and yield a class of fit that is essentially perfect. Depending upon size and location, the holes are either cored or drilled, leaving enough stock in the hole to accommodate the thread. Draft in cored holes need not be removed.

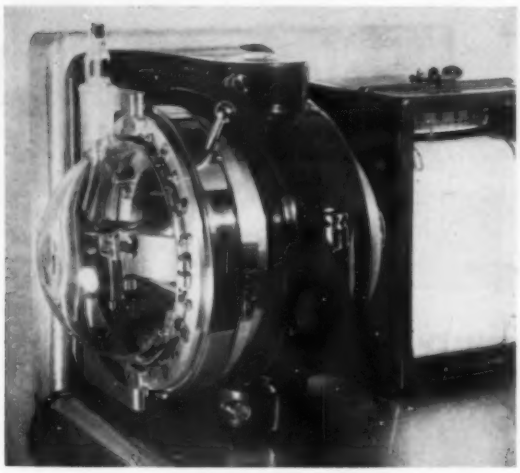
These screws are in three categories: thread cutting, thread rolling and drive screws. The first of these has a slot or tap flute which actually removes metal by a cutting action as it is driven; the second forms a thread by compressing the die cast metal; the drive screw, with its steep spiral thread, is hammered into the hole and makes a permanent fastening.

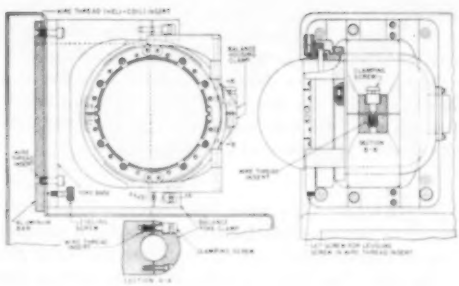
These fasteners are available in a wide range of sizes, and have slotted, hex or Phillips heads. Combinations of thread, shank and head can be selected to suit the material being fastened and the functional requirements of the job.

Thus, a thread-cutting screw that removes metal chips and exerts relatively little outward pressure, may be more desirable where it is to be driven into a thin wall section, but a thread-rolling screw may be the preferred fastener where maximum vibration-resistance is needed. Each of these classes of thread-forming screws has been designed to drive with a minimum torque requirement, but where faster driving is necessary, it is sometimes advantageous to specify a hex head. Drive screws find their greatest application for permanent assembly of stamped metal to die cast surfaces, such as the attachment of nameplates, engineering specifications, operating instructions, etc.

Spring-type fasteners: just as you can core a hole accurately to size and location, you can also cast a boss as an integral part of a casting. Bosses formed on die castings have many useful functions, since they are accurate enough to serve for locating and mounting other components.

While these bosses can be used as posts in which to core or drill screw holes, they also offer an important means for using economical spring-type fasteners[2]. Thus, if a die cast nameplate or escutcheon is to be mounted on a sheet metal surface, as in kitchen appliances, automobiles or other equipment, the die cast bosses are slipped through punched holes in the sheet, and secured in back by pressing small, spring steel fasteners over them. Com-





PROBLEM 2: Repeated tightening of adjustment screws

To protect threads in an aluminum instrument housing from the effect of repeated tightening of hard steel adjusting screws. In the Universal Recording Balance manufactured by Sharples Corporation Research Laboratories, the housing assembly is clamped on a gimbal ring held in a massive yoke; the balance housing is rotated horizontally or vertically by loosening screw-type clamps. Efforts to tighten these adjustments during a delicate test would probably result in stripping the threads.

SOLUTION: Stainless steel, helical wire thread inserts manufactured by Heli-Coil Corp., have been installed in all threaded holes for the balance yoke clamps (Section A-A), the balance housing clamp (Section B-B), mounting screws and set screws for leveling screws. These inserts, installed at low cost and without design modification, insure tight, strong connections throughout many adjustments.

SIGNIFICANCE: Where stripping, seizing, galling or corroding of threads is a problem, this type of insert can be used. They will save weight and space because 1) they require less space than solid bushings or bolt and nut assemblies, and 2) they need no greater boss radius than standard thread assemblies. Because insert has no wall thickness, it is lighter and smaller in external dimensions than a solid bushing for the same thread size.

Heli-Coil inserts are available in a wide range of standard sizes and thread classifications: National and Unified Coarse Thread and Fine Thread Series, as well as Automotive Spark Plug, Aviation Spark Plug and Pipe Thread Series.

---

pression of the steel clips, designed to bite into the boss, makes a firm attachment.

Many special designs of spring steel fastening devices are available as proprietary products. The economy of these "pressed-on" fasteners as compared with conventional threaded nuts is apparent: no threads have to be cut, no lock washers are needed, simple hand tools replace air or motor driven nut runners, and high speed production can be achieved.

Fasteners are available to fit recessed holes, edge attachments, keyed shafts and other special installations common to die cast design. Advantages include resistance to vibration, economy of application, and ease of mounting in inaccessible locations.

Self-fasteners: The ductility of zinc alloy can frequently be put to good use for self-fastening, depending upon the shape and requirements of the components. These are permanent assemblies accomplished by riveting, staking, spinning or other cold forming techniques.

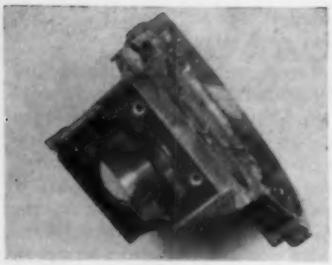
Cast bosses and cored holes, described above, also may lend themselves to self fastening. Automobile horns, for example, have made good use of the accuracy of location for mating bosses and holes, to join the right and left halves. Cast bosses around the flange of one member protrude through cored holes in the other, and are riveted over in a rapid, simple operation.

Other ways this special property can be utilized include: holding a circular insert into a cored rabbet by spinning over the rabbeted edge; clipping a stamped member in place by staking the die cast metal over the edge of the stamping; or casting a hollow boss to be riveted by conventional methods.

Cast-in inserts: Where there is danger of threads stripping from a die casting, inserts of brass, steel or other metals can be incorporated as integral parts of the castings to give greater resistance to tension and torque. The insert is placed in the die so that the molten metal surrounds it, holding it firmly as the casting solidifies. Location of such inserts can be maintained relatively close. Knurling, annular rings or other configurations on the insert help to lock it against endwise or rotary movement.

Inserts may be made to designer's specifications; however, a line of proprietary inserts of this type is available and can be obtained

Continued next page



PROBLEM 3:
Resisting Stress
In Power Tools

Heavy stresses have to be met by fasteners in the die cast magnesium housing for the McCulloch chain saw. The problem was to strengthen the assembled product without increasing assembly operations.

SOLUTION: By applying Tap-Lok self-tapping hardened threaded bushings in critical screw holes, high tensile load capacity and wear resistance have been achieved. The inserts are applied with a simple drill press with a tapping head. Special tool needed is a quick-release driver that is held in the collet of the tapping head. For higher production, the process can be set up for automatic feeding and tapping of the inserts into the die castings.

SIGNIFICANCE: Either cored or drilled holes can receive these inserts. In addition to all standard thread sizes ranging from #4 through ¾", special sizes are available for die castings having shallow through sections or other design considerations such as the need for a blind hole. Boss wall thicknesses preferably should not be less than one-third the insert OD, and hole sizes should be chosen as outlined by the manufacturer. If cored holes can be used, it saves a drilling operation; a chamfer around the top edge facilitates starting the insert.

PROBLEM 4: Fastening in blind locations

A front-mounting operation that requires fastening in blind, hard-to-reach locations, was a problem in attaching die cast aluminum handles to a modern folding door frame.

SOLUTION: Die cast handles have studs which extend inside the door frame. Tubular type Tinnerman Speed Nuts are snapped by hand into mounting holes in the door where cam-like prongs hold them firmly in place. The door covering is then positioned and the studs of the die cast handle are easily pressed into the clips. Turned-in ends of the fasteners bite into the studs to lock them in permanent position.

SIGNIFICANCE: Wherever troublesome handling of fasteners in inaccessible locations may be a problem, the use of this or other spring type fastener may simplify the job. The natural action of the spring steel fastener, gripping the die cast stud or recess, requires no manual turning or handling.

---

economically from stock. One manufacturer produces a two-piece molded-in insert that overcomes a basic handicap of the cast-in type of insert: inability to salvage castings where the insert becomes cross-threaded or otherwise damaged. One-piece molded-in studs are also available as standard inserts.

In using this type of insert, the designer must be certain that the insert is situated in such a manner that it can be positively held in the die and that there is sufficient cast structure around it for rigid support.

Threaded-in or pressed-in inserts: A popular method of reinforcing the threaded holes in non-ferrous cast metals is the insert which is applied after the casting has been made. These include inserts that: 1) are pressed into an undersize cored or drilled hole; 2) are threaded into a tapped hole[3]; and 3) cut their own threads in a cored or drilled hole.

This type of thread reinforcement does not slow down the casting cycle, as does the cast-in insert, but it does require additional steps in the assembly line. These inserts are available as proprietary, stock items in a variety of designs and metals, and serve to provide threads with high resistance to wear and stress.

Thread-in fasteners are easy to replace in the field, make maintenance simple, and offer considerable flexibility in design. When service experience indicates, these fasteners may be introduced, even though the castings had not been designed for thread inserts.

Simple tools are required to apply thread-in inserts, usually consisting of a special bit which engages a slot or tang. Power driving may be used for assembly-line speed. For push-in inserts, a simple arbor press serves for installation.

Welding and soldering: Because of the relatively low melting point of the die cast alloys, these methods that require application of heat have not been widely used. Recently, however, techniques for welding aluminum and zinc[4,5] and using ultrasonic methods for soldering aluminum die castings[6] have extended the potential use of these techniques.

Welding zinc can be done successfully using oxy-acetylene torches and methods that were originally worked out for the repair of castings. Problems of using a welding flame having a heat of about 6000 F on a casting having a melting point of about 725 F have been solved by certain recommended welding procedures, and proper preparation of the casting.

Welding aluminum has been put

Continued on page 63

Bellows DRILL PRESS FEED

AIR-POWERED RAPID TRAVERSE

HYDRAULIC FEED RATE CONTROL

ELECTRICALLY OPERATED

- **Installs in less than half an hour**
- **Often doubles, even triples production**

A Bellows Drill Press Feed quickly turns any standard manually operated drill press into an automatic or semi-automatic drilling unit—with full precision control over every phase of its operation.

A touch on the operating control and the drill rapidly advances to the work, is fed through the work under smooth hydraulic control, and returns to starting position. Cycling can be single or continuous. It can be electrically interlocked with work feeding and work holding devices.

The Bellows Drill Press Feed can be installed in less than half an hour. It can be moved from one drill press to another. It doesn't interfere with hand operation of the drill press.

More than 10,000 companies use Bellows Drill Press Feeds. In some plants as many as 400 Feeds are in everyday use—drilling, tapping, reaming, counter boring, threading—building production records that are hard to believe unless you use Bellows Drill Press Feeds yourself.

WRITE TODAY FOR Free BOOKLET

16 pages of facts on how you can use Bellows Drill Press Feeds to cut your drilling costs to a new low. Ask for Bulletin DF-110

Address: The Bellows Co., Dept. PMM-855 Akron 9, Ohio.

In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto.

Controlled Air-Power

1224-A

The Bellows Co.

Akron 9, Ohio

FOR FASTER, SAFER, BETTER, AND LOWER COST PRODUCTION

For more information circle No. 54 on the Reader Service Card

USEFUL LITERATURE CATALOGS, MANUALS

to get any of the free materials described here, circle the appropriate number on the reader service cards bound into this issue

PROCESSES

Casting Handbook: 144
A comprehensive guide to the design and specification of aluminum and magnesium sand, permanent mold and die castings has been announced by Rolle Mfg. Co. The advantages and disadvantages of each method are explored.

Standard Bearing Sizes: 145
A new, 30 page catalog has been issued by the Keystone Carbon Co. which lists more than 1000 commercial bearing sizes for powdered metal bearings and bushings. Sleeve, flange, double and single hub spherical bearings and thrust washers are covered.

Antioch Process Castings: 146
Specification sheets for a number of precision aluminum castings that have been made by the Antioch Process are available from Morris Bean & Co. These spec sheets show the large size and complexity that can be achieved by this casting process.

Copper Base Permanent Mold Castings: 147
Typical examples of non-ferrous permanent mold castings are given in a brochure from B-Mold Div. of Buckeye Brass & Mfg. Co. Also given are comparisons with other methods of casting and a listing of alloys presently being cast.

MATERIALS AND EQUIPMENT

Titanium Powder: 150
A new booklet has been issued by United International Research, Inc. that gives the properties and many of the uses of titanium powder. A short section is devoted to methods of production and to some of the special properties that can be secured in the powders.

Hydraulic Tubing Fittings: 151
A brochure from the Flodar Corp. describes a new, self-flaring tubing fitting for all sizes of tubes from 1/8" to 2" O.D. The fitting is said to give unrestricted fluid flow and to withstand greater pressures than the tubing it is used on.

Metal Melting Furnace: 152
In a six page brochure, Bulletin No. C-80, Eclipse Fuel Engineering Co. introduces a new dry hearth reverberatory furnace with either single or double dip-outs. Sizes, capacities, etc. are given.

Shell Cores: 153
Shallway International Corp. has issued a leaflet on a new shell core making method. According to the leaflet, shell cores for experimental purposes can be made with little or no new equipment. All aspects of core making are covered.

Precision Boring: 154
Ex-Cello Tool Tips for May, 1955, describes several different boring jobs that can be done at high speeds with a high degree of accuracy on Ex-Cello machines.

Fire Extinguishers For Magnesium: 155
A brochure describing the special extinguishers for magnesium fires has been issued by Buffalo Fire Appliance Corp.

Oven Handbook: 156
A 20 page handbook giving technical operating data, uses, etc. on industrial ovens has been issued by the Michigan Oven Co. Numerous tables and formulae for helping select the proper oven are given.

Oil Seal Manual: 157
A 26 page reference manual and data book on oil seals for all types of service has been published by Johns-Manville. Included are suggested seal designs, application data and case studies.

Die Casting Machine Specs.: 158
The complete specifications and data on performance of a complete line of Swiss-built die casting machines are available from Buhler Bros. The line of machines, both hot and cold chamber, ranges from 60 to 750 tons locking pressures.

Reproduction Material: 159
The Eastman Kodak Co. has published a new booklet that lists and describes the complete line of Kodagraph materials for copying and reproducing drawings and documents. A special chart is included to help select the proper film and paper best suited to any job.

Mold Release Agents: 160
A brochure from Injection Molders Supply Co. describes both the silicone and zinc stearate mold release agents.

Thermostat Metals: 161
A new thermostat bi-metal, ASC-3, has been announced by the Industrial Div. of American Silver Co. In a technical data sheet just released, the new material is fully described and all of its engineering properties given.

Heat Treating: 162
Two new booklets have been released by Lindberg Engineering Co. One is a comprehensive data book on the lay-out and equipment for a tool-room heat-treating department. Floor plans, suggested equipment, etc. are covered. The other book deals with Cyclone tempering furnaces.

Flask Pin & Bushing Catalog: 163
Catalog F-1030 from Universal Engineering Co. features the complete line of flask pins and bushings. Standards in plain, tapered, round, hexagon and threaded series are all covered. Pins and bushings are carburized and hardened.

Molybdenum Disulfide: 164
A field report, No. 138A, has been issued by The Alpha Molykote Corp. that shows, reportedly for the first time, the structure of individual flakes of molybdenum disulfide. Electron micrographs at a magnification of 24,000 X are given.

Pattern Casting Wax: 165
A new casting wax, PC-44, has been announced that is reported to have superior casting and molding characteristics for making investment casting patterns. Complete technical data on this wax, together with samples, can be obtained from the Wax Div., Petrolite Corp.

FINISHING

Spray Washing: 169
A four page brochure describes some of the products of Turco Products, Inc. that are useful on continuous spray washing systems.

Finishing Compounds: 170
A group of separate catalog pages available from Lea Mfg. Co. describe some of the special Lea compounds for different finishing operations.

Blast Finishing: 172
Faster, more versatile blast finishing can be done with one of the several finishing machines described in a brochure published by R. W. Renton & Co.

Heater Control Equipment: 173
A four page catalog from Glo-Quartz Electric Heater Co., Inc. describes the line of thermostats, timers, contactors, and cut-off switches available from the company.

Hot Spraying: 174
The advantages and economies of hot spraying of paints and lacquers and the equipment for hot spraying are given in material that has been published by The Spee-Flo Co.

Protective Finishing Systems: 175
Two new technical data reports have been released by Heatbath Corp. One covers the chromate finishing of zinc base die castings and the other the bright finishing of aluminum.

Paint Bond: 176
A four page brochure on bonding materials to hold paint onto metal surfaces has been issued by Turco Products, Inc.

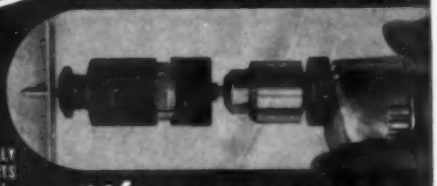
Finishes for Aluminum: 177
The tenth article in a series that has been running in Reynolds Metals house organ, Technical Advisor, covers silver, gold, porous chromium and special plates as well as organic finishes.

Rust, Paint, Phosphate Stripper: 178
In a new bulletin, Oakite Products, Inc. describes a new stripper that removes rust, paint and phosphate coatings from metals. The new process is said to eliminate up to six separate operations by older methods.

Sliding Head Drill: 179
A new sliding head drill has recently been introduced by Cincinnati Lathe & Tool Co. The new drill is fully described in a nine page catalog.

Continued on next page

NOW AUTOMATIC Hole DEBURRING



with NOBURMATIC TOOL

New Noburmatics deburr and chamfer front and inaccessible back hole faces in ferrous and non-ferrous sheets, plates, extrusions, castings and forgings ***in one automatic operation.*** Used in drill motors or stationary machine tools, Noburmatics produce uniform deburring with high accuracy, increase production line speed. Made in all drill sizes from 1/8" (.125) to F(.256).

Entry Noburmatic enters hole, advances to limit stop, DEBURRS FRONT FACE. (Rear cutter now projects.)

Withdrawal BACK FACE DEBURRED. Cutter automatically retracts. Tool ready for next cycle.

For Free Bulletin and Full Details, Write Today!

NOBUR MANUFACTURING COMPANY
717 N. VICTORY BLVD., BURBANK, CALIF.

For more information circle No. 58 on the Reader Service Card

WHAT'S THE BEST WAY TO STRIP METAL PARTS IN LARGE VOLUME?

See page 9

Are you looking for better methods for stripping paint?

Do some finishes resist your present stripping methods? Do rejects pile up and cause a bottleneck in your production line? Do you have trouble stripping vertical surfaces of large products?

Oakite's FREE booklet on "How to STRIP PAINT" will help you find more efficient procedures. You'll want to read more about:

¶ What's the best way to strip paint from metal parts too large to be soaked in tanks? *See page 3.*

¶ What's the best way to strip large areas of structural metal where a steam supply is available? *See page 5.* Where steam is not available? *See page 7.*

¶ What are the best ways to prepare stripped metal for repainting? *See page 11.*

¶ What strippers are best for removing oil-base paints? . . . Synthetic enamels, alkali-resistant plastics or resin-based paints? . . . Japans, wrinkle finishes, nitrocellulose lacquers, alkyds, phenolics and ureas? *See page 12.*

FREE For your copy of "How to STRIP PAINT" just write or mail the coupon.

Technical Service Representatives in Principal Cities of U. S. and Canada

OAKITE

OAKITE PRODUCTS, INC.
34G Rector St., New York 6, N. Y.

Send me a FREE copy of "How to STRIP PAINT"

Name _____

Company _____

Address _____

For more information circle No. 59 on the Reader Service Card

New From Lindberg-Fisher

For Permanent Mold and Sand Casting of Aluminum, Magnesium, Zinc and Lead.

A Lindberg-Fisher Electric Resistance Melting Furnace can mean lower cost per lb. of finished casting.

These furnaces eliminate localized heating of metal, eliminate gas absorption, because there are no products of combustion present. Higher production results, due to less operator fatigue. Exhaust fumes and smoke are nonexistent and radiation loss is held to an absolute minimum by use of high quality insulation.

Longer crucible or pot service and low furnace maintenance are obtained with the patented long life, low voltage elements.

Can also be used as a holding furnace on die casting applications.

Write for Bulletin No. 320

LINDBERG FISHER **MELTING FURNACES**
A Division of Lindberg Engineering Company
2463 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

For more information circle No. 62 on the Reader Service Card

USEFUL LITERATURE — cont.

Plating Anodes: 180
In a seven page catalog, R. Lavin & Sons, Inc. give technical information on electrolytic copper anodes and list, with chemical analysis, some of the other anodes regularly made by the company.

Water Thinned Paints: 181
A new line of water thinned paints and lacquers, said to have good adhesion, toughness, moisture and chemical resistance, is described in a brochure from Universal Paint & Varnish, Inc. They are reported to be suitable for decorative coating of untreated die castings.

Materials for Barrel Finishing: 182
Lord Chemical Corp. has published a catalog that describes many of the products made for barrel finishing. Full technical data are given for each material.

Buffing & Finishing: 183
An 11 page reprint available from Formax Mfg. Corp. gives technical information on buffing, polishing and grinding.

Bright Nickel: 184
Two new brochures are available from The McGean Chemical Co. on anodes and chemicals for bright nickel plating.

Automatic Plating: 185
A bulletin B 50-55 has been issued by Wagner Bros., Inc. that describes the company's new, fully automatic plating machine.

Plating Room Chart: 186
The Frederic B. Stevens Co. has published a wall chart for plating rooms that provides space to list the minimum stock of plating supplies that should be carried as well as the minimum practical order. Also on the same chart are emergency first aid measures for the plating room.

Aluminum Finishing Chemicals: 187
Two four page folders devoted exclusively to the chemicals for cleaning and treating aluminum have been issued by Diversey Corp.

33 YEARS
"BETTER THAN EVER"

PEERLESS
STANDARDIZED PINIONS and RACKS
FOR
DIE CASTING PERMANENT PLASTIC MOLDS

Standard sizes of Peerless "Flame Hardened" Ejector Racks and Pinions are available for prompt shipment. Special sizes may be produced to your specifications.

We welcome your inquiries.

Peerless Gear & Machine Co.
320 N. WESTWOOD AVENUE
P.O. Box 317, Station "C"
TOLEDO 7, OHIO
Established 1921

For more information circle No. 40 on the Reader Service Card

on a production basis in a number of plants, and includes both inert arc welding of die cast assemblies, and spot welding of castings to stampings.

A process for soldering tin-lead type die castings which has also been used for work on zinc base die castings has been developed, requiring careful technique. Solders and fluxes are available which can accomplish this job with good soldering practice.

A more recent development has been the use of ultrasonic equipment for fluxless soldering of aluminum die castings. This method requires special equipment, and is capable of producing sound, hermetically-tight seals between castings.

The use of one of the above welding or soldering methods expands the range of usefulness of die cast parts where shapes too complex to die cast in a single piece are concerned, or where pressure-tight joints must be developed between die castings or between die castings and other metal parts.

References:

1.) "Pick A Screw That Forms Its Own Thread," Precision Metal Molding, Oct. 1954, p. 63.

2.) "15 Ideas For Using Spring Type Fasteners To Assemble Die Castings," Precision Metal Molding, July 1954, p. 51.

3.) "Thread Damage Can Be Prevented," Precision Metal Molding, July 1954, p. 56.

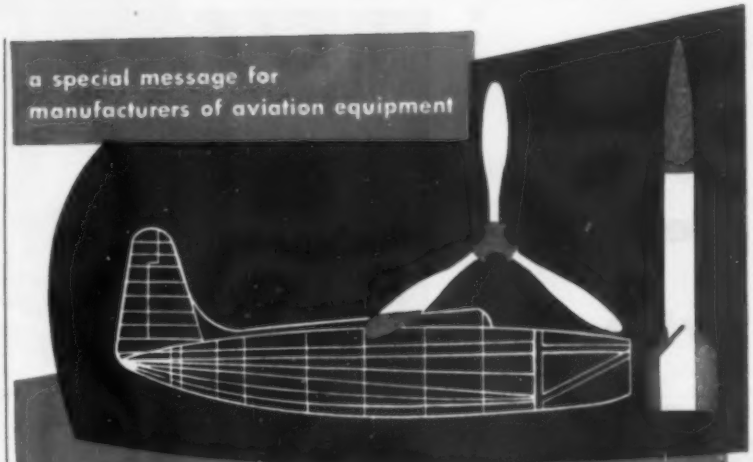
4.) "New Design Features Possible By Welding Die Castings To Sheet," Precision Metal Molding, June 1954, p. 42.

5.) "Here's How Aluminum Die Castings Are Welded In Production," Precision Metal Molding, Jan 1954, p. 34.

6.) "Three Ways To Use Ultrasonic Soldering On Aluminum Die Castings," Precision Metal Molding, Nov. 1954, p. 65.

THANKS ARE DUE: The editors of PMM are indebted to the following for assistance: Aeroprojects, Inc.; Aladdin Rod & Flux Mfg. Co.; All-State Welding Alloys Co., Inc.; Eutectic Welding Alloys Corp.; Groov-Pin Corp.; Heli-Coil Corp.; Palnut Co.; Parker Kalon Div., General American Transportation Corp.; Rosan Inc.; Tinnerman Products, Inc.

a special message for manufacturers of aviation equipment



need a finish for light metal parts? specify IRIDITE®

Here's the finish that combines corrosion resistance and paint adherence with extreme ease of application. It can be welded or soldered with no difficulty and presents no problem in "patching" scratches, marks or scraped sections. Here's what you can do with Iridite:

ON ZINC AND CADMIUM you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.

ON COPPER . . . Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.

ON ALUMINUM Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.

ON MAGNESIUM Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

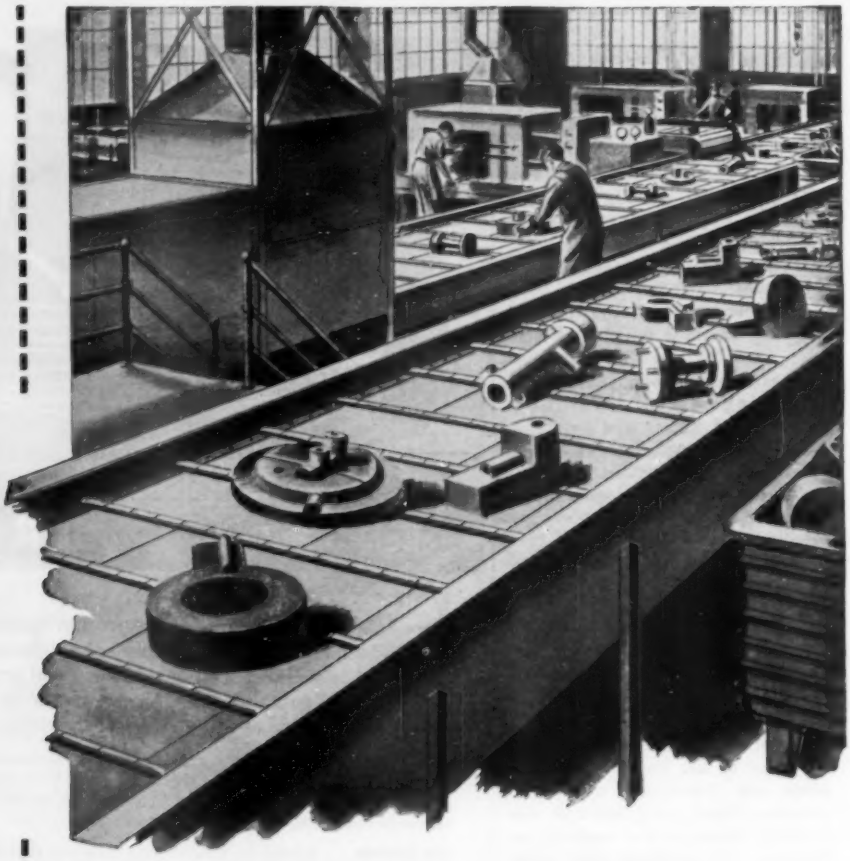
WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified phone book.

ALLIED RESEARCH PRODUCTS
INCORPORATED
4004-06 E. MONUMENT STREET • BALTIMORE 5, MD

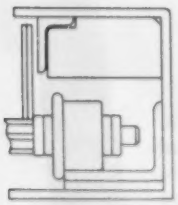
Manufacturers of Iridite Finishes for Corrosion Protection and Paint Systems on Non-Ferrous Metals, ARP Plating Chemicals.
WEST COAST LICENSEE: L. H. Butcher Co.

For more information circle No. 53 on the Reader Service Card

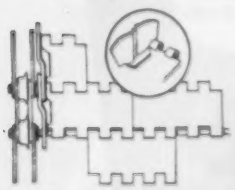
the belt with 9 lives



May-Fran hinged-steel conveyor belt . . . out performs them all in the foundry



Drawing shows construction details of "skirt" which prevents entry of foreign matter and protects side chains.

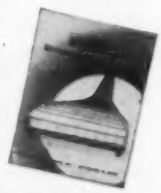


Outside links incorporate interlocking wings . . . remain positively engaged at all times.

May-Fran Belting is precision formed . . . specifically designed and developed to handle hot, heavy and the most abrasive parts. That's why it has nine lives.

Heavy gauge hinged-steel links are connected in horizontal rows by means of high-carbon steel rods. Side chains become an integral part of the locking wings which remain positively engaged at all times. Link and rod construction eliminates fall-through.

Widths furnished from 6-inches to 6-feet can meet your specifications for a steel conveyor belt of any length or carrying capacity. Either solid or perforated links are available in 2½, 4, 6, 9 and 12-inch pitch lengths. For conveyor belting that out performs, out lives them all . . . specify May-Fran Hinged-Steel Conveyor Belting.



MAY-FRAN ENGINEERING, INC.

WRITE TODAY FOR LITERATURE

3073-MF

1686 CLARKSTONE ROAD • CLEVELAND 12, OHIO

DESIGNERS AND BUILDERS OF COMPLETE HANDLING SYSTEMS

For more information circle No. 31 on the Reader Service Card

to get any of the free materials described here, circle the appropriate number on the reader service cards bound into this issue

PRODUCT NEWS AND DEVELOPMENTS

METAL POWDER PRESS FOR "IMPOSSIBLE" PARTS

With the introduction of a new multi-motion press, parts can now be made from metal powders that have been considered too complex to make. With the new press, it is now possible to make multiple level parts, parts with inserts and others that either could not be made or for which tooling was previously so expensive that the economies of powder metallurgy were lost.

The basic press has a single upper punch motion and two lower punch motions with a stationary core rod. The lower punches are both actuated by a single compression lever. This applies upward pressure with a positive force, doing mechanically what would otherwise be accomplished by spring-loaded punches. By designing these motions into the press, tooling is greatly simplified.

Rated capacity of the press is 50 tons on the upper and the outer lower punches and 30 tons on the inner lower punch. The die table will support the full rated loading.

Simple adaptations of the basic design permit a second upper punch, a third lower punch or a movable core rod. This allows formation of multiple level parts with flanges above as well as below a horizontal center line, double recessed parts, etc.

F. J. Stokes Machine Co.
For more information, circle No. 196 on the Reader Service Card

ENDOTHERMIC GAS GENERATOR FOR BRIGHT HARDENING

A new streamlined endothermic atmosphere generator, completely wired, piped, and assembled in a package unit is now available.

The generator utilizes a fully automatic process for producing low cost protective atmosphere for bright hardening, bright annealing, or bright brazing of steel totally free from decarburization or carburization.

The new generator is available in 500, 750 and 1500 cfh sizes and provides production economies and gives better, more precise operation with ease of maintenance.

Some of the advantages claimed for this generator are: 1) Occupies minimum floor space; 2) Main components of control panel are mounted at a convenient height; 3) The carburetor is easily cleaned without the aid of tools; 4) A larger catalyst bed; 5) Ceramic retort is interchangeable with an Inconel retort; 6) Factory equipped with safety devices to meet all requirements.

Lindberg Engineering Co.
For more information, circle No. 197 on the Reader Service Card

MESH-TYPE ABRASIVE RESISTS FILLING AND LOADING

A mesh-type waterproof coated abrasive product that is said to be highly resistant to filling and loading has been announced.

The material is composed of a cloth mesh coated on both sides with mineral grains bonded to the cloth with a heat-resistant waterproof resin. Either aluminum oxide or silicon carbide abrasive grain is available.

The new abrasive has a self-cleaning action which allows the stock removed to pass through the mesh, thus avoiding filling. The abrasive can be used by hand or machine and comes in grits from 100 to 400. Cleaning is by blowing with compressed air.

Minnesota Mining & Mfg. Co.
For more information, circle No. 202 on the Reader Service Card

USCO K-Z

USCO K-Z Aluminum Die-Casting Alloy is a high zinc variation of the popular USCO K. In other words, USCO K-Z is an AXS-679 Revision 3 alloy with zinc up to 2% maximum. The physical properties of K alloy are retained in the K-Z alloy, at a price saving to you.

USCO K-Z, like all other USCO Aluminum Alloys, is production and quantometric controlled from raw materials to finished ingot under the most modern methods of alloying and refining—giving you the properties you desire in your castings.

As with all USCO Alloys, if you desire, K-Z can be tailor-made to fit your specific needs.

Let our metallurgical engineers, who have a practical working knowledge of die-casting, aid you in selecting the correct alloy and assist you with your melting and casting problems.

USCO

U. S. REDUCTION CO.

East Chicago, Indiana

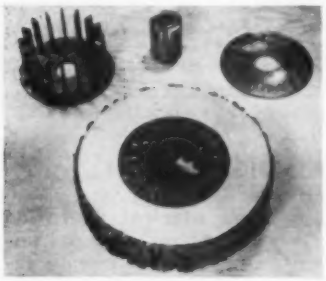
PLANTS: EAST CHICAGO, INDIANA • TOLEDO, OHIO

For more information circle No. 49 on the Reader Service Card

NEW PRODUCTS
continued from page 65

CONTOUR POLISHING WHEEL
. . . reduces finishing costs

A basic improvement in automatic metal polishing and reduction in polishing costs are credited to a new type of wearable coated abrasive contour wheel.



The new wheel is said to permit polishing of complex contours with an efficiency not attained before. It is substantially an all-coated abrasive wheel, and thus is capable not only of being shaped to the work, but also of holding that shape as it wears.

Designed for use on straight-line and rotary automatic polishing equipment, it is equally adaptable to semi-automatic fixtures where it requires no special attachments or other accessory equipment.

Behr-Manning Div., Norton Co.
For more information, circle No. 204 on the Reader Service Card

MOLD RELEASE AGENT
. . . for shell molds and plastics

A new mold release agent that is said to give instant release of both thermoplastics and thermosettings in all types of molding operations has been announced.

The release agent is apparently highly applicable in both shell molding and the injection molding of patterns for the investment casting industry.

The material has a density of 1.0 (8 lbs. per gal.) and a viscosity of 25 cps. It is nonflammable, nontoxic, noncorrosive and milky white in color. In use it can be applied by spray, brush or simply wiped on.

Axel Plastics Research Laboratories
For more information, circle No. 201 on the Reader Service Card

NEW TYPE SILICA
. . . in micron sizes

Announcement has recently been made of a newly developed, soft, amorphous type silica which should be of special interest to metal molders and finishers.

The material, known as Dustex Micro-silica, has a particle range of 1 to 15 microns (98% minus 10 microns) and according to the manufacturer has a number of superior features.

In addition to increased surface area, Dustex has a low pH value and higher oil absorption. New and improved manufacturing equipment has been installed to assure consistently high quality and positive production control.

Tamms Industries, Inc.
For more information, circle No. 200 on the Reader Service Card

FIRE-RESISTANT FLUIDS
. . . with wider viscosity range

Two new fire-resistant hydraulic fluids have been announced that extend the range of an existing fluid over a much greater viscosity range.

The two new fluids, designated as Pydraul 150 and 600 are reported to have the same fire-resistance, lubricity, non-toxicity and non-corrosiveness as the company's Pydraul F-9.

Pydraul 600 is specifically designed for die casting machines, presses, etc.

Monsanto Chemical Co.
For more information, circle No. 205 on the Reader Service Card

Continued on page 68

SPEED UP PRODUCTION with DOUBLE-ACTION DRYING

Air-dry as you spin-dry with the new, improved New Holland Model 20 KREIDER CENTRIFUGAL DRYER

• Now you can *spin-dry* small parts in continuous *fresh air* in as little as 15 seconds.

Double-action drying with peak-efficiency evaporation gives smooth moisture-free surfaces . . . reduces your finishing problems by eliminating the scarring frequently responsible for costly "rejects."

Your operators will be able to boost production, cut costs way down when you install New Holland's easy-to-run Model 20 Kreider Centrifugal Dryer.

SAFER because of Mechanical and Electrical Control Features!

To unlock cover and **remove basket, operator must depress foot brake, stop spinner.**

Machine cannot start with open cover. Ample clearance allowed for quick loading.

To start spinner, operator must first close cover completely.

SPECIFICATIONS:
1 h. p. motor—220, 440, 550 volts—2- or 3-phase—spins 75-lb. loads at 825 r.p.m. . . . Quiet V-belt drive . . . 30-blade suction turbine draws air through spinner . . . . Arc-welded steel-plate construction . . . Heavy-gauge woven steel mesh basket . . . Weight: 490 lbs. . . . Floor space: Just under 5 sq. ft. . . . Meets N.F.C. specs. **Optional:** J.I.C. Control: Mounted on right, left side or wall. 160° supplementary heat: 2350-watt Chromalox, or steam.

Send for illustrated 4-page folder. Address Dept. PM-855, New Holland Machine Company, New Holland, Pa.

NEW HOLLAND MACHINE COMPANY
NEW HOLLAND, PA.

For more information circle No. 57 on the Reader Service Card

For more information circle No. 64 on the Reader Service Card

STROH

FOR OVER 50 YEARS

PRODUCERS OF FINEST ZINC DIE CASTINGS

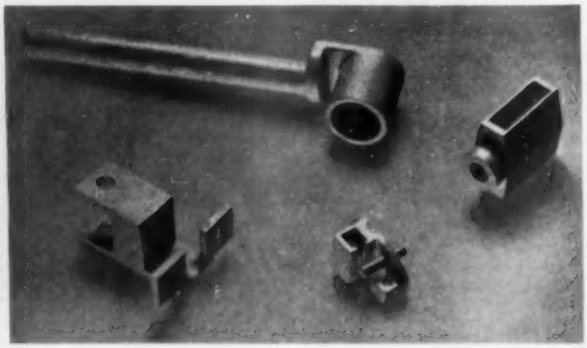
Old in years but modern in production—STROH facilities for zinc die casting combine the experience of yesterday with the vision of tomorrow.

STROH'S superiority has won and held customers since the turn of the century.

Inquiries Invited!

STROH DIE MOULDED CASTING CO.
525 East Michigan St., Milwaukee 2, Wisconsin

These parts were cast by Z&H MFG. CORP. by the "LOST WAX PROCESS" thereby eliminating costly machining operations



Scale: 2 to 1

MACHINED? or CAST?

Solve it with *Precision Investment Castings.* They're cast centrifugally, with all models and molds made by Z & H, specializing in non-ferrous metals; enabling us to give you sample delivery approximately 3 weeks from day we receive order.

Prompt quotations on blueprints. Send yours now.
Or write for full information.

Z & H MFG. CORP.
31 Welcher Avenue • Peekskill, New York

For more information circle No. 52 on the Reader Service Card

NEW PRODUCTS—cont.

TITANIUM ALLOY . . . has higher tensile

Announcement is made of a titanium alloy with a tensile strength of from 65,000 to 85,000 psi, in which small additions of aluminum replace the less desirable interstitial elements such as oxygen.

Advantages of the alloy are said to lie in improved impact strength and a notched fatigue endurance ratio in the range of 28 percent to 32 percent at 10,000,000 cycles.

Clevite Corp.
For more information, circle No. 203 on the Reader Service Card

REDESIGNED BARREL FINISHER . . . more efficient operation

A manufacturer of barrel finishing equipment has recently redesigned one entire line of machines to give increased efficiency and a more modern, streamlined appearance.

Units in this line are available for precision finishing small, intricate parts or large castings or forgings. In many cases production savings of 80% or more have been reported.

Six different models and sizes are available in the new series so that almost every industrial barrel finishing requirement can be met. All models emphasize high production rates.

Many safety devices have been included in the new line of barrels, and operations have been made so smooth and easy that even female workers can operate the units without undue fatigue.

Speed-D-Burr Corp.
For more information, circle No. 198 on the Reader Service Card

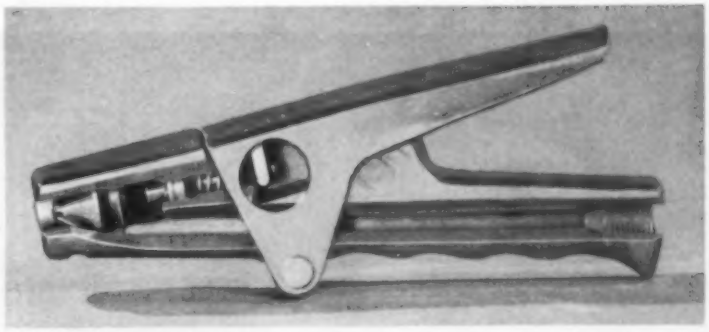
FIRE EXTINGUISHER
continued from page 31

2. The carrying handle and bracket handle are load-carrying parts, supporting the fire extinguisher's charged weight of 22¾ pounds.

3. All six die castings must withstand outdoor exposure, industrial atmospheres, humidity, etc.

4. All six die castings must perform dependably, despite severe operating conditions such as heat, cold, constant vibration on moving vehicles, etc.

Ability of the die caster to pull cores at odd angles has made possible the production of the nozzle body by this method. The cutaway view, above, shows how the two cores are set at an acute angle to each other to provide interconnected channels through the body for passage of dry chemical and the propellant gas (carbon dioxide). The two cores join inside the casting, producing a complex internal shape without the need for deep hole drilling.



DOUBLE CORE provides interconnected passageways without deep hole drilling, as shown in this section view of the assembled nozzle.

Only secondary operations on the castings, as received, are: 1) *threading* on the fill cap, 2) *turning* on the nozzle body, 3) *reaming* on the nozzle body and handle, 4) *drilling* on all castings, and 5) *polishing* with cloth buff on all castings.

The low cost of obtaining a suitable finish was a factor in selecting aluminum die castings for these components. The precise shapes, smooth as-cast surfaces, and clean detail help to meet the designer's plan on a production basis. Although die castings can be produced with hardware finish that needs little if any polishing, in most cases it is desirable to bring out the metal's lustre with a buffing operation. Because of the good quality starting surface, less labor and expense are required to buff a die casting.

Are you receiving our monthly house organ—THE HENNING MESSENGER? We know you'll get a kick out of the contents and suggest you ask to be placed on our mailing list.

HIT THE MARK! WITH HENNING

Zamak (Zinc Base) Die Casting Alloys

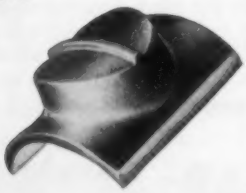
If you aim to use the finest alloys on the market without paying any premium for Quality — select H. B. & S. For more than 35 years our product has been first choice of discriminating buyers. Shipments made speedily by truck or in car load lots from our own private railroad siding. Certified analysis accompanies each shipment.

Our alloys meet all Government, ASTM and SAE specifications.

HENNING BROS. & SMITH, INC.
91-113 Scott Avenue • Brooklyn 37, N. Y.
"DEPENDABLE SERVICE SINCE 1922"

The striking difference in color shows comparative resistance to oxidation, proves superiority of RESISTOX Metal Powder (left) when exposed same length of time as ordinary powder.

Resistox Process gives Glidden Metal Powders more stability through greater resistance to oxidation!



Glidden Resistox Metal Powders offer you distinct storage and production advantages over ordinary metal powders because they resist oxidation from 5 to 10 times longer!

This exclusive Resistox Process permits storage over long periods of time without fear of oxidation, thus eliminating production and product-quality problems.

Glidden Resistox Metal Powders meet every requirement for uniformity, purity, consistency, strength. There is less material waste and die wear. They permit faster production of precision parts with greatly improved finish, appearance and performance characteristics.

Let us supply you with more complete information on these Glidden products: Resistox Copper and Lead Powders, Cuprous Oxide, Cupric Oxide and Cubond (Copper Brazing Paste). There's no obligation.

THE GLIDDEN COMPANY

CHEMICALS • PIGMENTS • METALS DIVISION

Baltimore, Md. • Collinsville, Ill.
Hammond, Ind. • Scranton, Pa.

QUALITY Glidden PRODUCTS

CHEMICALS PIGMENTS METALS

For more information circle No. 19 on the Reader Service Card

NEWS OF INDUSTRY AND ASSOCIATIONS

PRECISION CASTINGS MERGES WITH HARRISBURG STEEL; TOTAL SALES 60 MILLION

Merger of Precision Castings Co. major producer of die castings, with Harrisburg Steel Corp., has been approved, according to a joint announcement made by William J. During, president of Precision, and J. T. Simpson, president of Harrisburg Steel.

The merger brings together organizations whose combined sales total $60,000,000. Precision reports annual sales from its nine die casting plants of about $30,000,000. Precision Castings will operate as a subsidiary of Harrisburg Steel, whose principal products are special alloy castings, heavy extrusions, forgings, frogs and switches for railroad track, and high pressure cylindrical containers for compressed gases.

Precision Castings, said to be the largest independent die casting company in the United States, employs 2,500. In addition to its plants in this country, it has an affiliate in England, the Wolverhampton Die Casting Co. Harrisburg Steel operates five units, all in northeastern United States except for one plant in Birmingham, Ala.

MISCO TAKES OVER STANDARD ALLOY

Consolidation of two long-established alloy casting companies is announced by "Misco"—the 48-year-old Michigan Steel Casting Co. The latter firm has acquired the Standard Alloy Co. of Cleveland, moving its operations, patterns, and certain of the production personnel into the larger plant at Detroit. The Cleveland plant has been sold.

Jack Bean

"Effective July 1, our name became Michigan-Standard Alloy Casting Co.," states Jack Bean, president of Michigan Steel Casting Co. "We will continue to be a division of Consolidated Foundries & Manufacturing Corporation. Our trade name Misco, will be retained."

HPM ANNOUNCES POLICY DECISIONS

Two management decisions bearing on future operations have been announced by G. B. Robinson, Chairman of the board of The Hydraulic Press Manufacturing Company of Mount Gilead, Ohio, following what he described as a complete review of company policies and plans by the board of directors.

The first of these, Mr. Robinson said, is a decision that H-P-M will continue as an independent company. H-P-M has been mentioned repeatedly in reports of consolidation negotiations in recent months.

The second development is the selection of the key personnel to carry out new decisions reached by the board in its policy review. Mr. Robinson identified five key executives who will play important roles in the company's new program.

The five executives selected for important roles in the new program are: William H. Bennett, vice president—sales; J. W. Arnold, vice president—manufacturing; William N. Woodward, secretary-treasurer; Robert J. Lindsey, director of engineering; and Glenn R. Pittman, sales manager, Hydraulic Power Div.

HUMBLE IS VICE PRESIDENT, ALUMINUM INDUSTRIES, INC.

The appointment of Thomas L. Humble as vice president and general manager in charge of production at Aluminum Industries, Inc., Cincinnati, Ohio has been announced by Harrison O. Ash, president.

Thomas L. Humble

Prior to joining Aluminum Industries, Inc., Mr. Humble was with Chrysler Corporation, Detroit, as a member of the vice president's staff of Plymouth. He was in charge of setting up various plants throughout the country and tooling up outlying plants. In his new position at Aluminum Industries, he will direct their recently announced expansion program.

JOIN INVESTMENT CASTING INSTITUTE

Four new companies have been elected to membership in the Investment Casting Institute, it was announced today by Ted Operhall, Institute president. Companies and their representatives include Brace, Inc., Minneapolis —C. H. Brace; Illinois Precise Casting Company, Chicago—Robert J. Harvey; Industrial Fine Castings Ltd., Toronto — T. W. Morewood; and A. P. Green Fire Brick Company, Mexico, Missouri—Karl K. Breit; which was elected as an affiliate member.

Other new ICI members, which have been elected within the past few months include: W. H. Anderson Company, Inc., Bone En-

Continued next page

Circle No. 47 on the Reader Service Card

Tamms

NEW!

Soft amorphous type

MICRO-SILICA

with these special features:

Oil Absorption (G & C) 36.4 to 40.3 lbs.
pH Value ..... 5.0 to 5.2
Moisture 0.5%

New improved equipment assures highest quality and production control.

PARTICLE SIZE RANGE 1 to 15 microns

98% MINUS 10 MICRONS

WRITE TODAY FOR SAMPLES, PRICES AND SPECIFICATIONS

TAMMS INDUSTRIES, INC.
228 N. LA SALLE ST., CHICAGO 1

gineering Company, Budd-Stanley Company, Inc., Fallon Industries, Precision Castparts Corporation and Z and H Manufacturing Company.

Affiliate members recently elected include Anderson Laboratories, Inc., Industrial Raw Materials Corporation, Michigan Steel Casting Company and National Aluminate Corporation.

CASALBI BUYS OUT GLOBE TUMBLING UNIT

Announcement was made today by Clifford M. Sparks, president of Casalbi Company, Jackson, Michigan, of the purchase by Casalbi Company of the nationally known Globe tumbling barrel from the Hupp Corporation of Cleveland, Ohio. The purchase includes all machinery and equipment, patents, goodwill, etc. Production will start in Jackson early this month. Tumbling barrels are widely used for de-burring machine parts, die and grey iron castings, for polishing, burnishing and descaling.

TOWNHILL JOINS HARVILL AS DIRECTOR OF ENGINEERING

Arthur Townhill has joined the Harvill Corp., Los Angeles die casting firm, as director of engineering, President R. C. Clevering has announced.

Townhill's engineering, production and scientific background spans more than 30 years, including two decades with Thompson Products, Cleveland. For ten years he was in charge of Thompson's light metals division, where he devised scrap reclaiming methods, designed an automatic casting machine, and supervised the development of special forging and casting projects. He holds eleven patents on pistons, fittings and casting machines. In 1953 he traveled to Germany to study advanced forging and casting methods.

Arthur Townhill, left, with R. R. Dreibus, vice president of Harvill.

Prior to joining Thompson Products, Townhill held key engineering positions with several leading national firms, including ALCOA, General Motors and Lycoming Mfg. Co.

SPEED-D-BURR NOW SEPARATE CORPORATION

The Speed-D-Burr Division of Miller Machine Tool and Gauge Company, Glendale, Calif., is now known as Speed-D-Burr Corporation, Glendale, according to H. J. Miller, President.

The new corporation will conduct all operations at 3613 San Fernando Road, Glendale.

It's True!

One Set of AUTO-DIESEL Plunger Rings have lasted OVER 122 days

It is hard to believe the unheard of records that Auto-Diesel Hardened Steel Plunger Rings have made. In one plant a set lasted over 122 days — they were immersed in molten zinc over 800 hours. THEY ARE GIVING OVER 100,000 SHOTS IN MANY PLANTS. (Names furnished upon request). Will last for MONTHS instead of HOURS. Made of cast iron, dieloy cast iron or hardened steel. Will save money for anyone operating die casting machines or casting zinc parts.

Now Available

AUTO-DIESEL TWO or THREE PIECE Plunger Segment Rings

Auto-Diesel have added 3 piece Plunger Segment Rings — which will give longer life than 2 piece rings. They are especially made for hot chamber die casting machines and will give long life. Made of high grade wear resisting iron in sizes from 1½" to 4" by ⅞".

Write for Details

THE AUTO-DIESEL PISTON RING CO.
3135 Superior Avenue • Cleveland 14, Ohio

"RINGS and SHAPES Since 1921"

For more information circle No. 7 on the Reader Service Card

DIE CASTING ENGINEERS ORGANIZE NEW CHAPTERS; ELECT OFFICERS IN FALL

With three meetings during June, the recently organized Society of Die Casting Engineers completed the formation of two new chapters and set the stage for election of officers and expansion of membership in the Fall.

A Western Michigan chapter, centering about Grand Rapids, and a Northern Ohio chapter encompassing the Cleveland-Toledo area, were established in the SDCE, which is an engineering organization for the dissemination of information on die casting and related processes. The original chapter of this fast-growing group was the Detroit chapter which was formally established in October 1954.

Fall elections will be held by all chapters, with these officers then selecting a slate of national officers to be elected in the late Fall to take office January 1, 1956.

More than 150 members are listed at present. National headquarters of the SDCE is located at 19370 James Couzens Highway, Detroit 35, Mich. Membership is open to individuals whose business activities are concerned with die casting, die molding, finishing or the related arts.

Temporary officers for the two new chapters are: Western Michigan chapter — Merritt J. Nelson of Grand Rapids Die Casting Co., chairman; Herbert Lloyd of E. F. Houghton & Co., secretary; Northern Ohio chapter (Cleveland area) — Harry Cagin of Halex Die Casting Co., chairman; L. E. Pearch of Rex-Buckeye Co., secretary. Temporary officers for the Toledo area are still to be named.

Prof. William C. Truckenmiller of the University of Michigan addressed a June meeting of the Detroit chapter at Pontiac, discussing "The Development and Future of Die Casting." Besides reporting the historical development of the die casting process, and present trends, he suggested new developments which may affect the growth and improvement of this industry.

Joseph Fox, consultant, formerly chief metallurgist with the Doehler-Jarvis Corp., outlined fluxing and melting practices in a talk before the Cleveland-Toledo group meeting at Norwalk, Ohio. He stressed the methods of obtaining die castings that are sound internally, as well as being accurately shaped pieces of metal.

ADMIRAL KIRK HEADS ALLOY PRECISION

Admiral Alan G. Kirk, chairman of the board and president of the Mercast Corporation, New York, has also been elected to the post of president of Alloy Precision Castings Co., Cleveland, following the resignation of Ronald D. Gumbert. Admiral Kirk will continue to serve as chairman of the board of Alloy, a subsidiary of Mercast; Mercast Corporation controls the patents on the frozen mercury process of investment casting.

At the same time, the board of directors also announced the appointment of Frank W. Glaser as general manager of Alloy; he will continue in his role as vice president.

ASTM HONORS TEMPLIN

Richard L. Templin, assistant director of research for Aluminum Company of America, has been awarded an honorary membership in the American Society for Testing Materials at ceremonies in Atlantic City. This is the highest award the Society bestows.

NOW!

FREE BOOKLET
"Titanium Powder"

Clearly and concisely tells the story of

Titanium powder; its uses and properties, and the NEW and

exceptional method of producing it developed exclusively for a client by

UNITED INTERNATIONAL RESEARCH, Inc.
10-15 43rd Avenue, Long Island City, N. Y.
Dept. APM Tel.—STillwell 5-3458

PLEASE ADDRESS REQUESTS ON YOUR COMPANY LETTERHEAD

For more information circle No. 61 on the Reader Service Card

For more information circle No. 21 on the Reader Service Card

4 TIMES GREATER DROSS/METAL SEPARATION in ZINC and ALUMINUM MELTING WITH HAVILAND FLUXES

We have customers who are doing it now . . . separating *four times more metal from dross* with Haviland fluxes. They've found Haviland separated dross is so low in metal content that pulverizing or mechanical separation is both unnecessary and impractical! And they get better alloys, too.

FAST — even at lower furnace temperatures where other fluxes may fail.
SAFE — no dangerous, acrid, stinging fumes.
ECONOMICAL — you need less flux with Haviland . . . sometimes 50% less. You save both time and materials.

For free samples of Haviland fluxes for *your* zinc or aluminum melting operations, just drop us a line.

FREE BULLETIN — gives full information on these two new fluxes.
4B ALUMINUM FLUX — for use with all alloys and any type of furnace.
3G ZINC FLUX — complete alloy control . . . and extra metal savings.

Haviland PRODUCTS COMPANY
421 Ann Street, N.W. Grand Rapids 4, Michigan
Manufacturers of processing chemicals for the metal trades

Advance . . . always a good name to remember when you need aluminum and zinc DIE CASTINGS

The results of ADVANCE zinc and aluminum die casting engineering is seen everywhere today in home kitchen appliances, office equipment, power tools, engines, electrical parts, etc., etc. For years large manufacturers, and small, have preferred ADVANCE experience and long technical background — ability to produce design economies and meet rigid production schedules. Yes . . . ADVANCE is a source for zinc and aluminum die castings you can depend on. Write for our folder "YOUR DOORWAY to Certified Zinc and Precision Aluminum Die Castings".

These symbols are your assurance of highest quality zinc and aluminum alloys under ASTM standards.

ADVANCE TOOL AND DIE CASTING COMPANY
34 years of service to industry
3760 NORTH HOLTON STREET • MILWAUKEE 12, WISCONSIN

For more information circle No. 3 on the Reader Service Card

OPPORTUNITIES

Rates: $20 for the first column inch, $15 for each additional inch payable in advance.

WANTED — late model aluminum die casting machine, 400 tons locking. Prefer Cast-Master. Litemetal Dicast, Inc., 1927 Wildwood Avenue, Jackson, Michigan, Telephone State 3-4966.

FOR SALE—one Lindberg Fisher induction stationary holding and melting furnace. Type 40 K. W. 440-480. Single phase 60 cycle complete with wheels, pyrometer and furnace controls. Serial No. 5069 — No. 1 M-R-401-S. Price $1,000. Write Box 8155, PRECISION METAL MOLDING magazine.

PLASTIC DEPARTMENT SUPERVISOR WANTED for investment casting plant in Ohio. Must be thoroughly familiar with tooling, set-up, etc. Write qualifications to Box 8255, PRECISION METAL MOLDING magazine.

FOR SALE—Die casting machine—Zinc —4" tie bars—28" x 28" tie bar centers. Large accumulator for fast shot. Completely reworked. Automatic and manual operation. Complete with furnace. Now in operation. Write Box 8355, PRECISION METAL MOLDING magazine.

WANTED—man with powdered metal production experience to act as Shift Foreman. Asco Sintering Company, 7799 Telegraph Road (P.O. Box 2052—Terminal Annex), Los Angeles, California.

DIE CAST FIRM
INTERESTED IN
CO-OPERATIVE
MANUFACTURING
DEAL WITH QUALIFIED
ENGINEER HAVING
PRODUCTION KNOW-HOW
AND PRODUCT CONTACT.

COMET METAL PRODUCTS CO., INC.
132-00 91st Ave., Richmond Hill 18, N.Y.

DENISON ENGINEERING MERGES WITH AMERICAN BRAKE SHOE

American Brake Shoe Co., manufacturers of railroad equipment and industrial products, has purchased The Denison Engineering Co., a manufacturer of hydraulic presses, pumps and automatic controls, with general offices and main plant in Columbus, Ohio.

VACUUM DIE CASTING
continued from page 36

ceptional surface smoothness and dimensional uniformity in the cored sections of the castings. These factors are important in the production of all sand cored parts, and particularly so in cases such as the centrifugal pump impeller. Pump efficiency depends to a great extent upon the waterway smoothness of the impeller. Also by holding cores to close tolerances, waterway uniformity is obtained, making for perfect hydraulic balance in the impeller itself and uniform pump performance from unit to unit.

This company has developed several innovations in the field of sand coring, one of particular interest being the forming of a one-piece core to produce the Francis or "tipped" vane impeller. Since the design of this type vane precludes the drawing of a core from the core box, cores of this type previously were made in segments and subsequently pasted together to form a unit. Produced in one piece by this company, this core forms much smoother and more dimensionally uniform impeller waterways than a segmented core, and at the same time eliminates extra cleaning operations.

A few of the impeller sizes and styles now in production for major pump manufacturers are shown in Figure 2. A factor worthwhile considering on parts of this nature is the possibility of cost reduction in finish machining. In that the external surfaces are cast in steel dies, finish machining operations are reduced to only the turning of the hub for a close running fit and the machining of the bore to receive the motor shaft. Balancing also is minimized or eliminated completely.

The use of vacuum die cast parts is not restricted to just a few fields, but rather can be found in wide and varied applications in the aircraft, automotive, electrical, chemical, appliance, and in many other industries. In all cases, these parts were specified for one or a combination reasons: high strength, corrosion resistance, wear resistance, shock resistance, non-sparking surfaces, freedom from porosity, machinability and uniformity.

FIRE-RESISTANCE

EASY MAINTENANCE

with UCON Hydrolubes
Trade-Mark
safety hydraulic fluids

UCON Hydrolubes are a *combination* of ingredients blended in balanced proportions for maximum safety, maximum efficiency, and easy maintenance—a synthetic lubricant, water, effective liquid and vapor phase corrosion inhibitors, special anti-wear agents, and an anti-freeze.

All these components add their beneficial properties to give UCON Hydrolubes remarkable advantages: fire-resistance that has been proved both in the laboratory and in 7 years' industrial use . . . no harmful effects on packings and seals . . . high viscosity indexes (150 to 160) . . . low pour points (below minus 55°F.) . . . no toxicity problems.

UCON Hydrolubes are supplied in viscosities of 200, 300, and 550 S.U.S. at 100°F.—and others can be made. There's a UCON Hydrolube to do *your* job.

Remember: **SAFETY** *is no accident . . . return the coupon today.*

UCON Hydrolubes *are products of . . .*
Trade-Mark

CARBIDE AND CARBON CHEMICALS

CARBIDE AND CARBON CHEMICALS COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

Please send me the booklet "UCON Hydrolubes," Form 7380.

Name _____

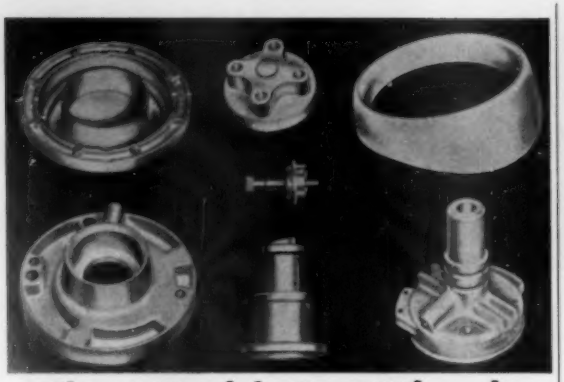
Company _____ Position _____

Address _____

_____

"Ucon" is a registered trade-mark of Union Carbide and Carbon Corporation.

For more information circle No. 12 on the Reader Service Card



The World On Wheels

Automotive Parts Die Cast in ALUMINUM and MAGNESIUM

Not only do automotive parts die cast in aluminum or magnesium effect important weight savings in today's beautiful automobiles, but they materially aid the designer and engineer who create these vehicles which literally place us in a "World on Wheels".

Through the use of these new light metal alloys greater scope is offered for practical and economical production. Manufacturers have proof that die cast parts of aluminum and magnesium make possible much lower production costs due to their virtual elimination of machining and finishing operations. In the photograph are illustrated a few of the lightweight automotive die castings by LITEMETAL. They include a Fan Spacer, Transmission Pump Housing, Servo Pistons, Window Regulator Shaft, Speedometer Trim Housing and Distributor Base.

Let's Talk It Over . . .

LITEMETAL DICAST, INC. is an organization of specialists — men thoroughly experienced in the casting and machining of magnesium and aluminum alloys. Our equipment includes big machines for big jobs — little machines for little jobs . . . the right sizes and types of the most modern die casting equipment for producing parts from the size of a button to large cable spools. Complete facilities for secondary operations are also available.

Write today for literature and design information. Quick action on inquiries.

LITEMETAL DICAST, Inc.

A DIVISION OF HAYES INDUSTRIES

1925 WILDWOOD AVE • JACKSON, MICHIGAN

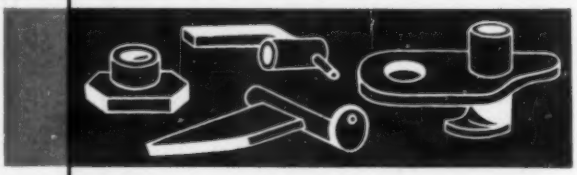
PLANT AND EXECUTIVE OFFICES

For more information circle No. 29 on the Reader Service Card

for better investment castings

Petrolite **casting waxes**

PC·13
PC·44



These Petrolite waxes, especially developed for investment casting, have all of the desirable qualities required for pattern waxes. They are hard and tough, without being brittle. They have wide solidification ranges. They can be blended to give any desired injection temperature.

These Petrolite casting waxes are suitable for use in either metal or plastic molds. They give patterns which are free from flow line defects due to rapid cooling. While these Petrolite waxes can be blended for special applications, either will, in itself, provide superior melting, solidification and molding characteristics.

these characteristics tell the story

	PC-13	PC-44
Melting Point, Ring and Ball	190-195°F	165-175°F
Solidification Point	160-170°F	140-145°F
Injection Temperature	200°F	140-180°F

Petrolite Casting Waxes are ready for prompt delivery at all times. They are packaged in 100 pound cartons, containing 8 slabs per carton. They are stocked at and available for shipment from Jersey City, Chicago, Los Angeles, or the Petrolite refinery at Kilgore, Texas. Samples and technical data are available on request – at no obligation.

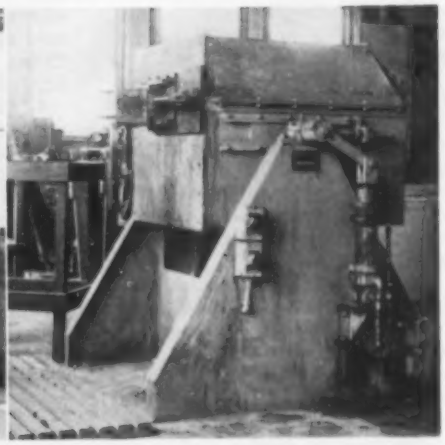
PETROLITE CORPORATION

WAX DIVISION

Chrysler Building, New York 17, N.Y. • P. O. Box 390, Kilgore, Texas

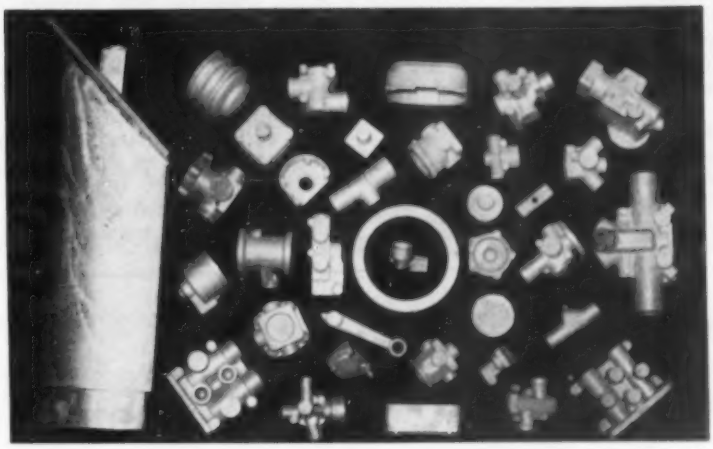
PC-13 44

For more information circle No. 42 on the Reader Service Card



1. MOLD IS CLAMPED to face of the holding pot, with pouring accomplished by inverting the entire pot and mold hydraulically. Over-all view is at left, and closeup of casting machine, top right.

2. CASTINGS produced by this method are shown at right. Piece at left of the ring-shaped casting is a valve body used on emergency pneumatic system and must meet specs of 7500 psi burst pressure.



Castings For Aircraft Hydraulic Systems

BY GEORGE C. FAITH

Automatic permanent mold casting is made possible by this new machine that takes most of the variables out of the production operation.

THE need for an aluminum casting that would have density and tensile strength almost equal to that of a forging but would have the lower cost of permanent mold castings, has long been recognized by the aircraft industry . . . not to take the place of forgings but to supplement them.

The designers and manufacturers of aircraft equipment, such as high pressure pneumatic and hydraulic valves and regulators are particularly cognizant of this need. This type of equipment is usually made in small quantities and, with stretched out aircraft production program, the use of forgings just isn't feasible. Sand castings cannot be used because they do not have the density or tensile strength to meet the rigid specifications and requirements of the high-pressure field.

Recognizing these problems, the Western Gravity Casting Company was organized in Los Angeles by Henry and George Trich to produce castings by a new permanent mold technique that eliminates most of the variables that can be traced to the "human element" . . . the machine

Continued next page

operator. The process is based upon a machine developed during World War II, and illustrated in Figure 1.

Essentially the process is as follows:

1. A reverberatory furnace is used as a metal holding pot wherein the molten metal temperature is maintained by means of a pyrometer and thermocouple to within ±2 F.

2. The mold is attached directly to the face of the holding pot. This permits close mold temperature control by virtue of the conducted heat from the holding pot to the controlled repetitive pouring cycle. Either steel or graphite molds may be used.

3. The holding pot has a self-contained hydraulic system used to tilt the entire unit to pour the molten metal into the mold.

4. The speed of pouring is controlled by an adjustable restrictor valve in the hydraulic line to an actuating cylinder.

5. The length of delay at the conclusion of the tilting operation, is controlled by an adjustable timer that releases a solenoid operated selector valve and allows the unit to return to the horizontal position.

6. The operator opens the mold, removes the casting, closes the mold and starts the cycle over again by merely pressing a button.

It can readily be seen from the foregoing sequence that the operator has very little responsibility for the quality of the product for the following reasons:

1. He does not have to guess at the temperature of the metal or continually check with a hand pyrometer.

2. He does not have to be concerned about the mold temperature, since this is automatically controlled.

3. He does not have to ladle the metal from the pot to the mold. Consequently the metal does not have to be overheated to compensate for cooling during the ladling operation. Overheating frequently burns out some of the alloy constituents originally contained in the metal. Elimination of ladling reduces the possibility of getting slag or other foreign particles into the mold cavity during the pouring.

4. He has no control over the number of castings he makes per hour, or per day, since an automatically controlled cycle rate is established for him which must be maintained. This eliminates much of the "guesstimation" in estimating costs. Dependence is not upon a fast man, or a slow one, or whether or not he feels good today . . . it is a predetermined time cycle that remains constant for that particular casting.

5. Operator fatigue as well as continual hazard from handling molten metal in ladles is decreased to an absolute minimum. Such conditions allow the operator to do a better job for a longer period of time.

Some parts produced by this method of semi-permanent and permanent molding are shown in Figure 2. Most of them were made for aircraft equipment

CUT FINISHING COSTS THROUGH INCREASED PRODUCTION

Send for Free Literature Now!

SPRAY PAINTING MASKS
A competent engineering staff will counsel with you on the most efficient technique for handling your particular requirements.

PRODUCT DEVELOPMENTS BY C/M CONFORMING MATRIX

AUTOMATIC MACHINES
Increase production hundreds to one over hand methods. Reduce labor costs. Eliminate need of experienced workmen.

CLAMPS AND FIXTURES
Positive pressure and exact registration of the part in the mask. Reduce rejects. Free both hands for productive movements.

MASK WASHING MACHINES
50% faster than any other make. Cut solvent consumption. Avert production delays due to damaging of masks by hand scrubbing.

CONFORMING MATRIX CORPORATION
346 TOLEDO FACTORIES BLDG.
TOLEDO 2, OHIO

Circle No. 56 on the Reader Service Card

here's what DIE CAST GRC ZINC ALLOY THREADED FASTENINGS mean to you...

WING NUTS
WING SCREWS
THUMB NUTS
THUMB SCREWS
CAP NUTS

in terms of a better product, in terms of a more economical product!

Gries' unique techniques make possible closer tolerances, cleaner threads, greater dependability, durability, die-cast uniformity. Mass production means lower costs!

NEW BULLETIN AVAILABLE!
Fact-packed—shows how Gries ingenuity and money-saving methods can solve your fastenings problems.
Send today for your copy, prices and samples

GRIES REPRODUCER CORP.
157 Beechwood Ave., New Rochelle, N.Y.
Phone: NEw Rochelle 3-8600

World's Foremost Producer of Small Die Castings

For more information circle No. 20 on the Reader Service Card

manufacturers and are pneumatic and hydraulic valve bodies. Take the case history of one particular valve—the one indicated in Figure 2.

This valve will be used in the emergency pneumatic system of the F100 Super Saber. This little valve, which is only about 4" long and weighs less than ½ pound, must operate at air pressures as high as 3000 psi, with no external leakage or interflow, must function at proof pressures of 4500 psi. The specifications called for a qualification test of the valve body to withstand burst pressure of 7500 psi with no permanent deformation at this tremendous pressure. In other words, the yield in tension had to be over 7500 psi.

High pressure air or nitrogen creates forces of its own and if suddenly released, such as breaking through a blow-hole or weak spot, explodes with the force and fragmentation of a detonated bomb. So, little imagination is required to visualize what would

Continued next page

DIE CAST PARTS *to Your Specifications*

A pioneer in the die casting art, *Milwaukee* has long been a recognized leader in supplying *Die Castings as Specified* to all types of industry for all types of products from small precision instruments to massive heavy duty machinery. That is why you can entrust *Milwaukee* to produce die cast parts to your most exacting specifications — not only in dimensions — but in contour, weight, strength, pressure resistance, wear resistance, finish and other vital characteristics.

We Operate under the Certified Zinc Plan of the American Die Casting Institute, Inc.

MILWAUKEE DIE CASTING COMPANY
4146 N. HOLTON STREET • MILWAUKEE 12, WISCONSIN
Established 1909

Hoeganaes iron powders

Product designers constantly look to powder metallurgy as the means of maintaining parts quality, at greatly reduced costs. Through materials selection, they look to Hoeganaes Iron Powders to help solve this problem.

for superior, low cost

The particle shape of Hoeganaes Iron Powders easily interlock during compacting. The result: unsurpassed green strength. Then too, Hoeganaes large tonnage production guarantees uniformity within one and the same lot, from lot to lot, and from year to year. And there's the important factor of purity . . . with Hoeganaes giving you unrivaled purity with silica, the most abrasive impurity of all, well below .10%.

powder metallurgy parts

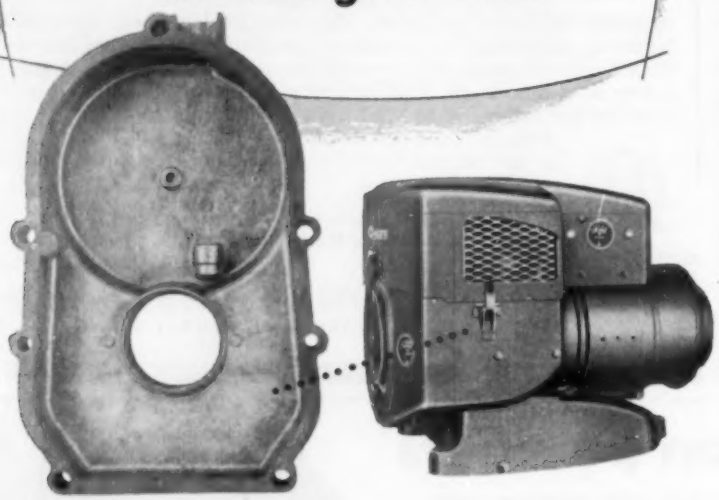
Your metal parts fabricator would like to give you more facts, all the facts, about Hoeganaes Iron Powders. He offers you cooperative consultation, engineering service and quality parts. We'll be glad to suggest such a valuable contact.

HOEGANAES

NEW, FREE informative literature on Powder Metallurgy. Send for your Hoeganaes literature "package" that describes advantages and production short-cuts that are possible with the Powder Metallurgy process.

HOEGANAES SPONGE IRON CORPORATION
545 FIFTH AVENUE, NEW YORK 17, N. Y. • PLANT: Riverton, N. J.

here's how TWIN CITY DIE helped Onan cut 19 machining operations off this gear case



Using sand casting methods, 31 expensive machining operations were necessary in manufacturing this Onan gear case. Machining operations were complex, time and handling costs were high. Costs had to come down.

Twin City cut the required machining operations to 12 by die casting the gear case and governor shaft boss in one operation. A loose core was inserted into the die before each "shot" to cast the double-diameter governor boss. Holding relative tolerances as close as .003 "over 6" eliminated many machining operations, simplified others. Result: far lower unit cost, far simpler machining—precision accuracy with production economy!

This Onan gear case is just one example of how Twin engineers and die casters work with you to cut your costs. Oldest die caster in the Upper Midwest, Twin City *keeps* its leadership because of its willingness and ability to look at every job through the customer's eyes.

Get the facts for yourself! Send us samples or blueprints and let us demonstrate Twin City service to you!

MACHINING OPERATIONS ON GEAR CASE

WITH SAND CASTING	WITH DIE CASTING	
17	0	Drilling
2	1*	Machining face
3	3	Ream rotor shaft holes (Tolerances: +.0003"—.0000; +.0005"—.0000"; +.001"—.000")
5	5	Tapping
2	1	Machining operations on main shaft bearing hole (Tolerance: +.000"—.001" I.D.; and +.001"—.000" O.D.)
2	2	Reaming dowel pin holes
31	12	

19 OPERATIONS ELIMINATED!

*Light sanding only.

TWIN CITY DIE CASTINGS CO.
3351 TALMAGE AVE. S.E. • MINNEAPOLIS 14, MINN.

For more information circle No. 48 on the Reader Service Card

happen if this were to occur inside a million dollar jet plane.

Four hundred and fifty of these castings were made and delivered and the customer reported that the castings far exceeded requirements, taking a burst test of 10,000 psi without measurable deflection. Only one casting was rejected because of a small pin hole in the boss.

Another feature of this method of permanent molding is the dimensional control achieved from casting to casting in the order of .001 to .003; castings in which porosity is, for all intents and purposes, eliminated and having a density of such magnitude that they average 5 to 10 percent heavier in scaled weight than regular types of permanent or semi-permanent mold castings.

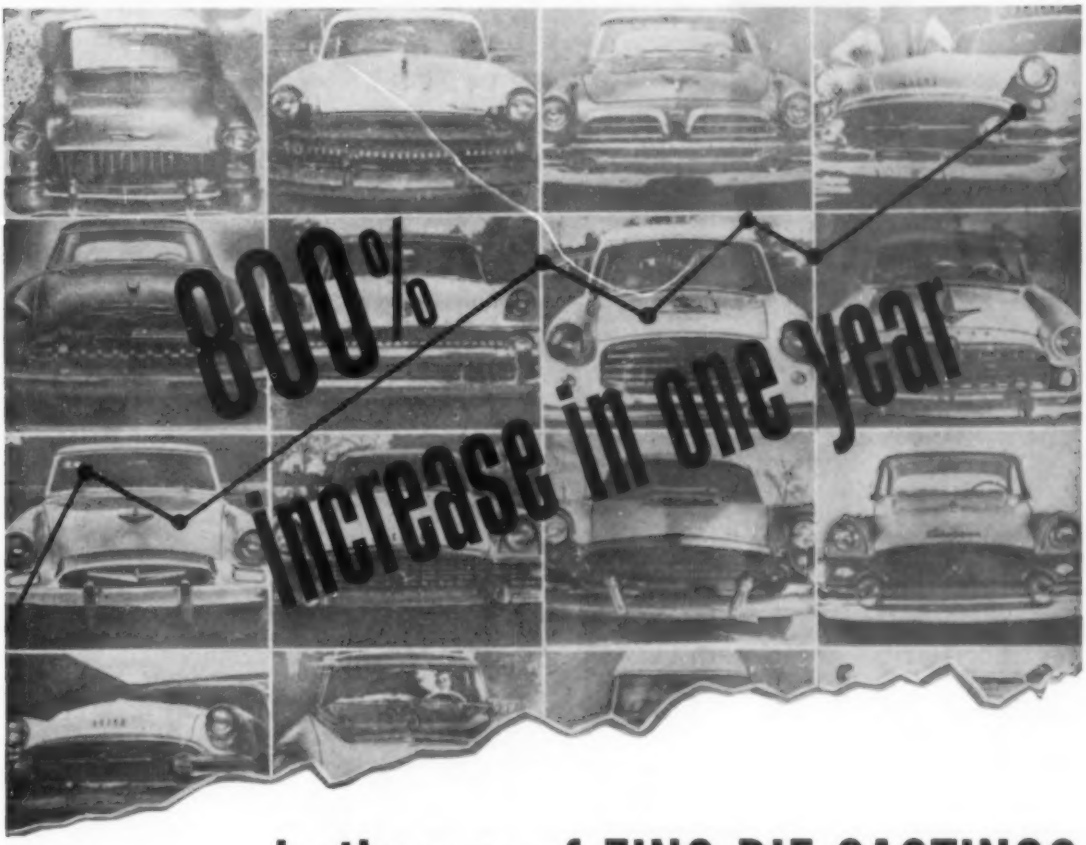
X-ray was utilized to pre-determine presence of gas pockets and it took the Trich brothers a year of experimentation to develop the proper techniques in mold making. For example, the area of the casting has a direct relationship with the mass of the mold because the mass must be such that it will allow controlled heat dissipation while the metal is solidifying.

PRECIOUS METAL
continued from page 53

plating bath is about 2.9 grams per liter of palladium, 8.7 grams per liter of sodium palladium chloride, 40 grams per liter of sodium chloride, 13.5 grams per liter of sodium nitrite. The pH of this bath is controlled at from 4.5 to 5.5. The palladium layer applied in this bath is 0.000050 inches thick.

Finally, the parts are washed and dried at 500F to remove residual cyanide and any dissolved hydrogen.

The last step before packing and shipping the plated parts is inspection. Plate thickness is checked periodically with a Kocour Electronic Thickness Tester, Figure 7, and visually inspected for gross flaws.



...in the use of ZINC DIE CASTINGS

A prime factor in the rapidly growing use of die castings has been the recognition of the process for what it has proved itself to be: The shortest distance between raw material and finished part. The automotive industry has been especially alert in taking advantage of this high speed production tool. 1955 models use eight times as much zinc die casting in front-end assemblies as the '54 models did.

Since this industry has been the top user of zinc die castings right along — taking more than half the total last year — the impressive swing to more zinc is significant. It definitely establishes the fact that zinc die castings are less costly to produce than those based on any other metal. Because of its low melting point, zinc can readily be cast in the most highly automatic machines. The more automatic and the more rapid the casting cycle, the greater the savings on costs. The smooth, as cast surface of zinc alloy castings is practically ready for plating. This gives zinc an advantage over all other die casting alloys for use as decorative objects and trim. In addition to all of the eye-catching chromium plated zinc die castings, the functional out-of-sight carburetor, fuel pump and windshield wiper housings continue to be zinc die cast at lowest cost.

The utilization of zinc die castings is also making rapid advances for important components in home appliances, hand tools, instruments, electrical equipment, business machines and innumerable other products which, were it not for zinc die castings, would be neither as attractive in appearance, as rugged, nor as low in cost.

BUNKER HILL 99.99+% ZINC

EASTERN SALES AGENTS **ST. JOSEPH LEAD COMPANY** 250 PARK AVENUE, NEW YORK 17
SALES OFFICE FOR PACIFIC COAST **NORTHWEST LEAD COMPANY** SEATTLE, WASHINGTON

INDEX OF ADVERTISERS

A

Accurate Die Casting Co. 42
Acheson-Colloids Co. 39
Advance Tool & Die Casting Co. 74
Aeroquip Corp. 15
Alcoloy Inc. 29
Allied Research Products, Inc. 63
Aluminum Smelting & Refining Co. .. Cover II
American Zinc Sales Co. 5
Apex Smelting Co. ..... Cover IV
Auto-Diesel Piston Ring Co. 72

B

Badger Die Casting Corp. 47
Baldwin-Lima-Hamilton Corp. 28
Bellows Co., The 59

C

Cannon-Muskegon Corp. 18
Carbide & Carbon Chemicals Co. 75
Cast-Master, Inc. 1
Celanese Corporation of America 6
Centr-o-cast Engineering Corp. 17
Certified Alloys Co. ..... Cover II
Chemical Corp. 8
Cleveland Tool & Die Co. 22
Conforming Matrix Corp. 78
Crucible Steel Co. of America, The 20

D

Dollin Corp. 19

E

Enthone, Inc. 2

F

Finish Engineering Co. 46

G

Glidden Co., The Chemicals-Pigments Div. 70
Gries Reproducer Corp. 78

H

Haviland Products Co. 74
Henning Bros. & Smith, Inc. 69
Hoeganaes Sponge Iron Corp. 79
Hoover Co., The ..... Cover III
Hydraulic Press Mfg. Co. 25

I

International Minerals & Metals Corp. ... 82

K

Kewanee-Ross Corp. 41
Kux Machine Co. 10, 11

L

Lindberg Engineering Co. 62
Litemetal Dicast, Inc. 76

M

Madison-Kipp Corp. 14
Marvel Engineering Co. 21
May-Fran Engineering, Inc. 64
Milwaukee Die Casting Co. 79
Mt. Vernon Die Casting Corp. 4

N

New England Die Casting Co. 30
New Holland Machine Co. 67
New Jersey Zinc Co., The 24
Nobur Mfg. Co. 61

O

Ockite Products, Inc. 61

P

Parker-Kalon Corp. 50
Parker White-Metal Co. 12
Peerless Gear & Machinery Co., Inc. 62
Petrolite Corp., The 76
Precision Castings Co. 7

R

Reed-Prentice Corp. 9

S

Geo. Sall Metals Co., Inc., The 40
G. W. Smith & Sons, Inc. 13
F. J. Stokes Machine Co. 26
Stroh Die Moulded Castings Co. 68
St. Joseph Lead Co. 81

T

Tamms Industries, Inc. 72
Twin City Die Casting Co. 80

U

United International Research, Inc. 73
Universal Die Casting Co. 48
U.S. Reduction Co. 66

Y

Yale & Towne Mfg. Co., Powdered Metal Products Div. 23

Z

Z & H Mfg. Co. 68

HUDSON BAY

SPECIAL HIGH GRADE ZINC — 99.99%

International Minerals and Metals Corp.

11 Broadway New York 4, N.Y.

One Fine Zinc For Die Casting

For more information circle No. 28 on the Reader Service Card

The Remington Typewriter base is a one-piece die casting made by The Hoover Company. It was designed as a die casting because this was the most economical way to produce the desired surface finish and because the complex shape of the item would make any other production method far too costly.
Remington

Solid base for savings

DIE-CAST by HOOVER

In 15 years several hundred thousand Remington Typewriters have been built on bases die-cast by The Hoover Company. As with many other leading American manufacturers, Remington Rand has found that die-cast parts mean faster, simpler assembly, improved product appearance and strength with elimination of dead weight.

If you use aluminum or zinc die castings, or if you think you *could* use die castings in your product, ask a Hoover engineer to call.

The Hoover Company
Die Castings Division
North Canton, Ohio

HOOVER

Specialists in the field of Die Castings since 1922

For more information circle No. 23 on the Reader Service Card

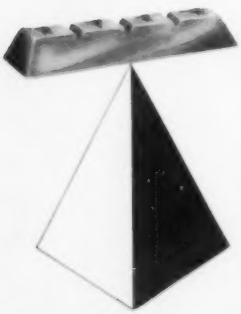
APEX die casting alloys

UNIFORM QUALITY ASSURED

ALUMINUM

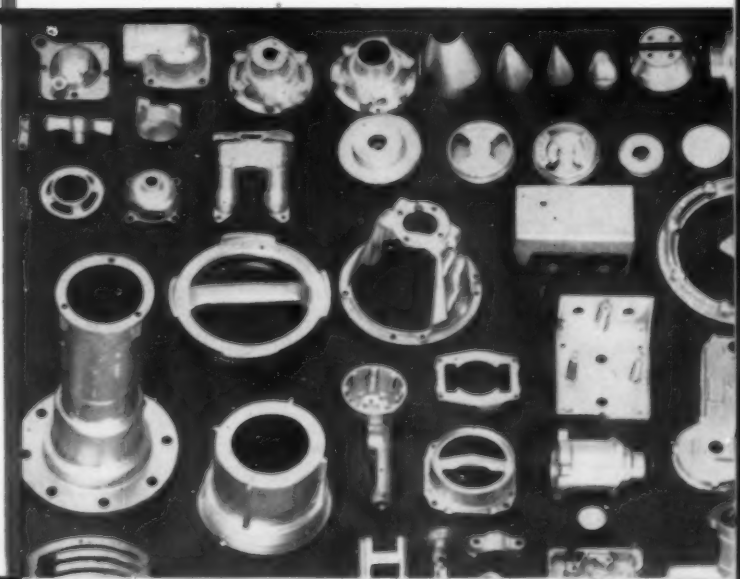
ZINC

You can depend on Apex alloys to meet your most rigid requirements—as specified! Precision quantometer quality control through every stage of smelting and refining assures dependable, money-saving performance in your foundry operation and in final application. Clean, gas-free Apex ingots afford you good fluidity, proper grain size, and superior castability. What's more, they're palletized for easier handling, inventory and storage. Plan now to profit from over 30 years of specialized smelting experience—specify Apex high-quality die casting alloys.



RESEARCH LEADERSHIP BACK OF EVERY INGOT

For more information circle No. 6 on the Reader Service Card



APEX SMELTING COMPANY

CHICAGO • CLEVELAND • LOS ANGELES